

Bradwell B Pre-Application Stage One Consultation

Response from the Blackwater Against New Nuclear Group (BANNG)

(BANNG Paper No. 44)

Introduction

In responding to the Consultation BANNG wishes to draw attention to three fundamental concerns. They are:

1. *The consultation process itself.* We consider the consultation is premature in that it is taking place before key issues have been fully considered, let alone resolved. These include the key Step 4 of the GDA, the long-awaited energy review and the revised National Policy Statement. The consultation is taking place during a national emergency when people are distracted and unable fully to participate or engage in the process.
2. *The scope of the consultation.* ‘The principle of the need for new nuclear power stations and the choice of Bradwell as a potentially suitable site is a matter for Government policy and outside the scope of the consultation.’ This is disingenuous and deliberately narrows the scope so that people may be led to conclude that the power station is already a ‘done deal’ and that they are only being invited to comment on the details of the project. The Government has identified Bradwell as a site through a process of site selection but Bradwell has not been redesignated by Government and, in any case, it is only a *potentially* suitable site. Therefore, the issue of whether Bradwell B should be built at all is very much a matter for discussion.
3. *The consultation is imbalanced.* By excluding the overall question of site suitability the consultation focuses on components of the proposal such as power station design, transport arrangements, port development and so on. This lures people into assuming the project is agreed with only the details to be determined. Additionally, far more attention is devoted to issues such as cooling system, transport, accommodation arrangements while the treatment of other matters of concern such as ecology, environmental and historical legacy, radioactive waste management etc are given scant coverage with little useful information on the detail or extent of what is proposed.

In Part 1 of this response we elaborate our concerns about the Consultation process. Then, in Part 2, we shall focus on the reasons why the Bradwell site is unsuitable for a mega nuclear power station (question 1 of the questionnaire provided with the Consultation). We then proceed, in Part 3, to give our views on the overall design and environmental impact (question 2) before, moving on, in Parts 4, 5 and 6, to the more detailed and sectoral aspects of the proposals on people and jobs, accommodation and transport (questions 3, 4, and 6). Our response broadly follows the sequence in the main Consultation Document.

Part 1. The Pre-Application Consultation – a flawed and unequal process

BANNG has made its views known about the consultation process in an exchange of correspondence in which we called for the process to be halted and re-run. The pre-Application consultation was announced with little warning and at an early stage in the developmental process. The proposal had just concluded Step 3 of the GDA process and was entering Step 4 where regulators undertake detailed assessment of evidence and when the Environmental Agency will hold its own public consultation. It is recognised that BRB is taking a considerable risk in presenting its proposals before it can be confident that it will pass the GDA analysis and assessment. It may be surmised that announcing its proposals was an attempt to pre-empt the GDA and to put pressure on the regulators to reach conclusions in line with the preferred options. Alternatively, the developer may have been given a green light that its basic proposals would find favour. Either way the Pre-Application Consultation may be construed as premature and pre-emptive creating a sense of premature legitimisation for the scheme.

This sense is reinforced by the limitations placed on the consultation and referred to above. By asserting that the need for nuclear energy and the choice of the Bradwell site are outside its scope, respondents might be deterred from commenting on why Bradwell is a 'potentially unsuitable site'. Overall, an impression could be conveyed whereby people concluded it was a 'done deal'. The whole narrative of the consultation gives the impression of narrowing the scope by suggesting the big decisions have been taken and it is a matter for respondents to the consultation to focus on details of an overall scheme that has already been accepted. Hence the documents focus heavily on such issues as transport, accommodation, the benefits of jobs, the design of the nuclear island and the location of beach landings, car parks, park and ride areas, etc. It may be argued that the whole document and the consultation is a rather unprincipled attempt to enlist support for a premeditated conclusion, only the details of which are up for grabs.

This sense of haste and conclusion was reinforced when BRB persisted with continuing with the consultation during the coronavirus emergency. Some major adjustments were made to the programme in the hope of maintaining momentum and a credible process. The original intention was to structure the consultation 'around a series of exhibition events and drop-in sessions' (Consultation Document, p.9). After staging five of the exhibitions during the first week, the remaining ten, including the three on the northern side of the Blackwater estuary, had to be abandoned as social distancing measures were enforced. In response to the emergency, the consultation period was extended and a virtual exhibition was introduced online together with interactive facilities and telephone surgeries in an effort to substitute for the lost exhibitions. As BANNG has pointed out in correspondence with BRB, the loss of exhibitions 'will bias the overall feedback and discriminate against the ten communities which will not have the equivalent opportunity of public interaction and discussion' (letter to BRB, May 18). In particular, virtual activities, however well developed, are no substitute for in-depth, face-to-face interaction with the BRB team as was witnessed at the Maldon and Bradwell meetings in particular.

In any event, BANNG considers that continuing the consultation during a period of crisis and lockdown was insensitive and counterproductive. During this time, life is, in some ways, paused, with altered working patterns, and social interaction shifting from the public to the domestic realm. These are not appropriate circumstances in

which to contemplate a future nuclear power station when faced with immediate issues of survival.

BANNG regards the Consultation as premature, pre-emptive and presumptuous in the present circumstances. We strongly believe it should be rerun when the social distancing measures have been relaxed, the review of NPS EN-6 has been published and the designation of Bradwell has been confirmed and when a more indicative outcome of the GDA is announced.

Part 2 Bradwell B proposals: overall

(a) No need for Bradwell B

The consultation documents recite the rather timeworn argument that the National Policy Statements (NPSs) establish an ‘urgent need’ for nuclear power. Therefore, since the need for such infrastructure has been demonstrated, ‘we are not consulting on the principle of nuclear power and the choice of Bradwell as a potentially suitable site’. BANNG considers this a little disingenuous. In the first place this policy was drafted in 2009ⁱ (EN6). It argued that nuclear should be able to contribute as much as possible to meeting the need for new generating capacity but was clear that there was no certainty that power stations could be deployed on all listed sites designated up to the deadline of 2025.

Clearly a great deal has happened since the NPSs were adopted in 2011. Most obviously renewable energy has proved highly competitive and will make an increasing contribution. During the decade to 2019 electricity demand in the UK declined by 16% rather than increased by 15% as the Government had predicted. Only one new nuclear power station has begun development (Hinkley Point C) and no other project has any chance of meeting the 2025 deadline for deployment. It is difficult to see how nuclear energy is capable of meeting the need that was evidently so ‘urgent’, according to BRB, way back in 2009. At the present rate of progress none, apart from Hinkley Point C, is likely to become available before the mid-2030s, by which time alternative systems of power production and distribution combined with energy conservation are likely to render big new nuclear stations, if they are ever deployed, an embarrassing and expensive form of power generation. In any event, it should be noted that there will still be substantial nuclear power (4.5GW) available from Hinkley Point C, if built, and Sizewell B right up till the middle of the century and beyond.

Moreover, the NPS on nuclear energy (EN-6) is under review as required by legislation and the sites are being reassessed as to their potential suitability for deployment up to 2035. At the same time the Government is conducting an energy review which will result in a White Paper on energy policy which presumably will have to recognise the dramatic changes in supply and demand that have occurred in the years since reviews were undertaken in the 2000s. Meanwhile, the Government is clinging to the existing NPSs, including statements about the need for nuclear, despite the overwhelming evidence that that need has been much diminished, if not entirely eliminated. Similarly, BRB latches on to the Government’s ‘preliminary view’ that the existing designated sites ‘are likely to be those which can deploy the soonest and are the only sites capable of deploying a nuclear power station by 2025’ⁱⁱ.

Strictly speaking, the Bradwell site is only designated for deployment until 2025. It is clear the Government's intention is to carry forward the sites listed in the current EN-6 as the only sites capable of deployment by 2035, subject to 'those sites meeting the strategic criteria as well as demonstrating they are credible for deployment by 2035'ⁱⁱⁱ. The Government was due to consult on a draft list of sites during Spring/Summer 2019 but has not yet done so. Therefore, we are in limbo, at a stage where the Government is considering whether sites should continue to be listed on the basis of each site's assessment against updated strategic siting criteria and updates of their environmental assessments. While it is true that Government continues to give strong in-principle support, it has, so far, stopped short of redesignating the site. Therefore, as things stand, the Bradwell site is only listed until 2025 and it is not certain (though it seems highly likely) that it will be listed for the period up to 2035.

Clearly, this Stage 1 public consultation is being undertaken at a most inappropriate time. Energy policy is under review but not yet determined and, therefore, the consultation is relying on historic data that bear little relationship to present reality and trends. Similarly, it is consulting on a site that is under review for a revised NPS. A consultation on strategic siting criteria has been carried out and revised criteria have been published. However, the proposed EN-6 has not been published with the sites listed against the criteria. Government will be consulting on the draft revised NPS providing an opportunity for scrutiny and comment on the site selection process. This Stage 1 Pre-Application consultation is premature in that it assumes the revised NPS will be endorsed having taken into account further observations from consultation. This is clearly the wrong way round.

On the issues of need for nuclear and the choice of site, matters which BRB indicates are outside the scope of the consultation, BANNG observes:

The need for nuclear energy is based on Government data that is now over a decade old. Given the White Paper on Energy is imminent, more relevant data will need to reflect the immense changes in energy supply and availability that have occurred, notably the rapid growth of cheap renewables and the decline of expensive nuclear energy. By the time Bradwell B could be operating, the need for nuclear will have further diminished and the remaining nuclear plants will be providing surplus and uncompetitive power. We urge BRB not to rely on outmoded government policy and to recognise that there is no need for large-scale nuclear provision from Bradwell

Furthermore, on the question of choice of site, BANNG considers the pre-Application consultation is premature in that it is being conducted before the revised NPS has been produced and consulted upon. BRB is proceeding on the basis that the choice of Bradwell as a potentially suitable site is a matter for Government policy and outside the scope of its consultation. We cannot understand this statement since the suitability of the site is currently under review by Government and, therefore, its suitability is in question and must be considered in this consultation.

In any event, the argument about whether suitability is consulted on is largely academic. In truth, the whole purpose of the Stage 1 consultation is for BRB to gather

feedback on the suitability of the site. Or, rather, to consider whether the Bradwell site, in the oft-repeated words of the NPS, is ‘potentially suitable’ for the deployment of a new nuclear power station when judged against the updated strategic criteria.

BANNG considers the Bradwell site to be unsuitable both in general and for a myriad of specific reasons.

There are three fundamental reasons why the Bradwell site is unsuitable as a whole. Firstly, it is unsustainable; secondly, it is inappropriate; and, thirdly, it poses unacceptable risks.

(b) *The Bradwell Site is Unsustainable*

Bradwell is situated on the low-lying Essex coast in a tidal floodplain of the Blackwater estuary which, undefended, would be flooded at high tide. Much of the site is in Flood Zones 2 and 3, highly vulnerable to flooding and especially to sea level rise, storm surges and coastal processes consequent on climate change. Various studies have demonstrated the site’s being prone to flooding. Well before the site was designated it was described as ‘vulnerable to subsidence, rising sea levels and rollover of the Blackwater estuary’^{iv} The potential impacts of climate change were well documented: ‘The Bradwell B site is low-lying and would need to be raised significantly in order to avoid potential flood risk and inundation from the sea’^v. The Institute of Mechanical Engineers pointed out in 2009 that coastal sites in East Anglia would need big investment to protect them against rising sea levels ‘or even abandonment/relocation’.^{vi} EN-6, while putting the site forward, was very tentative about its vulnerability especially in the longer term. ‘The Environment Agency has advised that it is *potentially* reasonable to conclude that a nuclear power station within the nominated site could *potentially* be protected against flood risks throughout its lifetime, including *potential* effects of climate change, storm surge and tsunami’^{vii} (our italics).

It is becoming increasingly unreasonable to reach even such a tentative conclusion of the impacts of climate change on sea level rise, storm surges and coastal processes. If present trends continue, global warming could reach 3°C to 4°C by the end of the century and, even if it can be reduced to 2°C based on the Paris accords of 2015 or, better still the 1.5°C urged by the IPCC (Intergovernmental Panel on Climate Change)^{viii} - now looking increasingly unlikely - sea level rise of around 1m will occur and rising seas are inevitable beyond 2100. The Environment Agency presently suggests that we need to prepare for a 2°C rise but plan for a 4°C rise by the end of this century. Sea level rise (SLR) does not simply stop there and climate impacts will continue into the next century even if counter measures to hold global warming succeed.



Insert: maps of flooding predicted for 2100, Climate Central)

To illustrate the point, one study of ice sheet contributions to SLR indicates that a high though by no means improbable global warming of 5°C could lead to a 2m rise in sea levels by 2100, resulting in land loss, disruption of food production and displacement of up to 187 million people. At that level of warming, the study indicates that by 2200 instabilities of the West and East Antarctic ice sheets could lead to a 7.5m. sea level rise. The interactive processes and feedback loops of global warming, including thermal expansion of the oceans, changes in ocean currents, slowing of the Gulf Stream, deforestation, melting permafrost, desertification, changing land use and carbon emissions are complex, making prediction uncertain and, in the longer term, indeterminate. This leaves scope for much speculation about trends and tendencies with some scientists suggesting global warming may be accelerating exponentially or may be modelled as step functions rather than a linear upward trend. The only certainty is uncertainty. In the event of worst case scenarios, the loss of nuclear power stations would be an incidental calamity in the face of an overwhelming global catastrophe.

(i) Taking account of climate change 1: Surrender to the sea

Whilst recognising the need to take climate change into account, the documents give no clues as to the risk assumptions made and the levels of uncertainty taken into account in planning the infrastructure. It is acknowledged that existing flood embankments ‘would not be sufficient to protect the Bradwell B power station from flooding over the full lifetime of the plant, taking account of climate change’ (Consultation Document, p.38). There are no observations on the time-scales for flooding, periodic or permanent, merely that it will not be possible to protect the whole site from inundation. It appears to be conceded that the majority of the site will be surrendered to the sea in due course. In the interim, this area will undergo remodelling necessitated by the massive extraction, earth movement and redistribution during construction and the subsequent projected plans for marshland conservation, areas of ecological and agricultural restoration. This will include the new integrated landscape area and presumably some scattered developments outside

the main development site (access roads, pipelines, working areas). At this stage the shape of the landscape proposals is vague and will be subject to consultation with stakeholders and communities.

Observation: Much more information is needed on the assumptions, time-scales, predictions, uncertainties and risk assessments used in taking account of climate change.

(ii) Taking account of climate change 2: A sea-girt fortress

The plans envisage protecting the main development site of 100 ha. including reactors, turbines, cooling towers and long-term radioactive waste stores by creating a buttressed ‘nuclear island’ elevated above the surrounding sea. The power station would sit on a raised platform at an indicative 7.4m. AOD, pending more detailed studies to determine the actual level. But, ‘In the event of an extreme flood event, it would also be necessary to protect the power station from wave run-up and overtopping which would require new flood defences’. These would be rock armoured defences with a crest level of 9.8m AOD. It is not clear how this height was arrived at or if there would be any flexibility built in whereby height could be increased if sea level trends suggested adaptation was necessary. Such adaptations are planned for Hinkley Point C and Sizewell C. Such plans respond to the principle that ‘flood protection measures are made adaptable to cover possible changes to future estimates of climate change effects, as a way of managing the large uncertainties inherent in flood hazard prediction over the life-time of new nuclear reactor sites’^{ix}. In areas like the East Coast, natural protection from saltmarshes, mudflats, shingle beaches, sand dunes and sea cliffs has been rapidly declining. Recent projections indicate substantial parts of the coast will be below annual flood level in 2100 and predict a loss of between a quarter and a half of the UK’s sandy beaches leading to extensive inland flooding^x

Observation: It is essential that the developer provides assumptions and justification as to how account is taken of future climate change in its proposals beyond 2100.

It is questionable whether a policy of managed adaptation, if introduced at Bradwell, would be implementable in conditions of increasing uncertainty up to 2100, let alone in the unpredictable and unknowable conditions thereafter, stretching well into the next century. It would be imprudent and irresponsible to contemplate development of a new nuclear power station and long-lived highly radioactive waste stores in conditions which quite conceivably would overwhelm the site making the power station inoperable.

The proposals recognise the vulnerability of the Bradwell site to the impacts of climate change. The strategy for dealing with sea level rise and coastal changes is to plan for the eventual abandonment of the greater part of the site while ultimately creating a fortified island of the nuclear island. As conditions deteriorate the possibility of a serious accident occurs with radioactive releases from possible meltdown, loss of cooling, flooding of spent fuel stores and problems of access and emergency response^{xi}. These risks are low probability but high in consequence and, in the long run, cannot be defended against. The alternative is to accept the Bradwell site

is unviable and poses incalculable risk to the environment and public over a wide area. Therefore:

It is clear from evidence that the Bradwell site is potentially vulnerable in the period up to the end of this century and will become unviable in the next century as the impacts of climate change proceed. An approach of managed adaptation cannot be justified in the long run when conditions at the site will be unknowable. Therefore, the developer should withdraw its plans for a nuclear station at this site.

(c) The Bradwell Site is Inappropriate

The scale of the project is enormous. The power station, if built, will cover an area around 230 times Trafalgar Square. Foundations for the power station will extend down to 60 feet below the ground and the two reactors and turbines will be constructed on a “nuclear island” 7.5m. above sea level. Directly opposite Mersea Island will be cooling towers 50-60m. high (higher than the remaining buildings of Bradwell A) and 165m. wide. Highly radioactive spent fuel will be stored for upwards of 150 years in a building close to Bradwell village.

The main development site covers 500 ha. and casts its footprint across the whole north eastern end of the Dengie Peninsula and beyond. The nuclear island occupies 100 ha. and will stand like a medieval castle fortified on its raised platform and surrounded by massive sea defences set to repel the invading seas during the decades of sea level rise and battering by storms until the radioactive relic of the station with its spent fuel stores is immured as an island and possibly destroyed in the unforeseeable future. Beyond the island but within the development site, the existing landscape will be destroyed during construction by production and preparation areas, soil storage and redistribution.

During construction, transfer of materials by sea to beach landing facilities will cause further interference with the environment and existing sailing, fishing and shipping movements. On the landward side of the nuclear island accommodation blocks will be built for the construction workers with an entrance ‘plaza’ and parking which will engulf Bradwell village and Bradwell Waterside. Impacts will be felt far beyond the site on the Dengie and beyond from noise, light pollution and disturbance of heavy goods vehicles, transport interchanges and the amenity damage done by high tension power lines and towers snaking across the skyline.

The Blackwater estuary will also experience impacts during the construction phase and beyond. The cooling system will require construction of 1km. long intake and discharge tunnels into the shallow waters heating and polluting the water, damaging fish stocks and disturbing the seabed which feeds the much prized Colchester Native Oyster. In order to ‘minimise impacts on the marine environment’ (CD, p.41) volumes of water needed will be reduced by indirect cooling via cooling towers whose bulk, height and exhaust plumes will add to the insult that will be suffered by this massive development to a hitherto tranquil low-lying landscape.

Once built, the site as a whole will be given a makeover. The central buildings will be ‘a planned composition that is ‘coherent, clear, and uncluttered; developing a

coordinated architectural language for each of the key building groups’, a durable and robust design. The surrounding area will become a ‘Power Station Landscape Integration Area’ while beyond and up to the coast will be areas of farmland restoration, ecological reinstatement and habitat creation. The developer’s intention is to leave a legacy, ‘designed, built and operated in a way that we can all be proud of’ (p.75).

The overall aim ‘to deliver an efficient power station that relates to its setting on the Blackwater estuary and that can be built and operated in a safe and sustainable way, applying principles of new design’ is impossible to realise. The size, scale and impact of the Bradwell B proposed development can only be achieved by utterly destroying its setting and replacing the peaceful, low profile rural, marshland and estuarine landscape with an industrial complex, a massive and potentially dangerous intrusion.

It is interesting that the documents offer several photographs of the existing landscape which illustrate what will be lost if Bradwell B ever comes to pass.

Although there is a feeble attempt to portray the power station and all that goes with it as a benign, well-designed and even attractive concept, there is no escaping the reality that it will be a dominating, dangerous and discordant industrial complex, utterly transforming a precious and irreplaceable landscape and presenting a threat to wildlife on land and in the surrounding waters and a risk of radioactive release that could impact on local communities and a much wider area beyond.

The choice is clear: either to retain the existing environment, undemonstrative but a cornucopia of ecological significance, wildness, farmland and recreational space; or, to replace it with an alien, unbeautiful and unnecessary industrial colossus. There is really no choice. For the developer to pursue the project in the face of such destructiveness would be an act of reckless irresponsibility. For it to be permitted would be to savage a landscape, community and environment that can never be replicated or replaced.

Therefore, in view of the comprehensive damage and irrevocable impact of the proposed power station we urge the developer to withdraw the proposal.

(d) The Site is Unacceptable

Security and safety are matters for the regulators to consider during the GDA process which is ongoing. The consultation document comments that the regulatory process will ensure that the UK HPR1000 reactors will meet ‘high standards of safety, security, environmental protection and waste management’ (p.13). Emergency planning procedures must be put in place to deal with the ‘extremely unlikely event of an unplanned release of radioactive material’. In addition, spent fuel and radioactive waste would be managed in a manner that protects people and the environment. Other issues of security, including the possibility of cyber attacks and infiltration by terrorists, are matters for governmental and regulatory authorities. Issues of public safety arising from routine, planned or accidental emissions and discharges are under the jurisdiction of authorities, notably the Environment Agency.

However, the scale and intensity of impacts of deliberate or unintended releases resulting from an incident are heavily dependent on the location of the source of the release. Clearly, locating a nuclear power station in a densely populated inner city would not be contemplated. This is why relatively remote locations have been chosen. Bradwell and the Dengie Peninsula cannot remotely be regarded as a remote area. Within 5km. of the site is West Mersea with a population of 8000 permanent residents doubling in summer. Within a 30km. radius from the Bradwell power station site is an area covering the major urban areas of Colchester, Chelmsford and Southend as well as smaller towns such as Clacton and Maldon, an area with a population of around half a million.

In the event of a serious incident, evacuation of a population might be necessary. This would be difficult to achieve for the local population. Mersea Island, for instance, has only one access road and even this can be closed at high tides. It raises all kinds of questions. If the radioactivity spread much further afield, on the scale of Chernobyl or Fukushima, evacuation would prove logistically impossible in the densely populated areas of nearby Essex. How would the population be informed, how would they react, how would they be moved and where would they go? It would constitute a far greater challenge than the wartime evacuation of London, involving the total population, not merely its children.



It is scarcely credible that in conditions of utmost emergency the public will behave in an orderly, disciplined and rational way: there may be panic, bewilderment and misunderstanding. The warning systems may be inadequate and not reach everyone. Instead of staying put with doors and windows closed to avoid a radiation plume, people may panic and try to flee thereby creating gridlock. In the case of Mersea with its single carriageway access to the mainland, it may feel like being in a prison open to the radioactive skies.

Emergency Planning is an exercise in reassurance; if anything goes wrong it can be dealt with. It obviously can help but it is impossible to prepare for every eventuality especially in the face of a major accident involving widespread radioactive fallout. It is little use pretending accidents cannot happen. They might and there must be openness about the risks and caution as to what can practicably be done. And this

means that the possibility of a high consequence/low probability accident must be recognised and that in that eventuality it could have catastrophic consequences for which counter-measures will most likely prove totally ineffective.

The Bradwell site poses risks to environments and the population from routine, planned and unintended releases of radioactivity and other polluting substances. The power station will be sited close to a number of designated sites of scientific, ecological and historical significance and it discharges into a highly sensitive and significant Marine Conservation Zone. Local communities may also be exposed to levels of radioactivity that promote health consequences. In the event of a significant accident the surrounding population could be left exposed and unprotected.

In developing its proposals BRB should provide details of countermeasures that could prove effective in the event of releases of radioactivity from the power station. It should also indicate circumstances in which any countermeasures will prove ineffective and the relevant population would be unprotected and therefore at risk.

We consider the developer must provide a detailed risk assessment and analysis of the impact and consequences of a major radioactive release together with plans for how a major accident can be safely and securely managed. In the absence of such analysis and plans, BANNG considers that the risk of a serious incident with high consequences to environments and to a large population in the surrounding area from a nuclear power station located at Bradwell is *prima facie* a reason for not proceeding with the proposal at this site.

Part 3 The power Station: design and environment

We have given our overall views on the design of Bradwell B and its impact on the environment in the first part of this response. It is difficult to provide more detailed and specific views for three reasons. One, there is little detailed information on environmental impacts, conservation and restoration in the documents. EN-6 provides an assessment of the site's 'potential suitability' in terms of strategic siting criteria. EN-6 is now under review and BRB has indicated to the Government how the site meets the siting requirements. However, there is no indication in the consultation documents as to how BRB has responded to the revised siting criteria in the light of recent environmental and climatic information. Therefore, we must await publication and consultation on the revised EN-6 before we can respond in an informed way on the outline proposals in this consultation. Second, the plans are subject to an Environmental Impact Assessment and accompanying Environmental Statement which set out the environmental effects and impacts of the power station. Third, the Environment Agency will consult on its preliminary conclusions on the detailed assessment of Step 4 of the GDA. Fourth, as far as we are aware there has not yet been a Regulatory Justification of the UK HPR1000 reactor design whereby the benefits of the power station would be set against the detriments. Although this is primarily directed at health detriments it examines potential environmental consequences of radioactive releases.

At this Stage 1 consultation there is relatively little information on environmental impacts beyond a rather superficial overview lacking in detail or information. Much of this work is dependent on assessments and surveys now in progress. By contrast, there is considerable detail on issues of transport, accommodation and jobs. This presents a rather imbalanced picture in which the presumed benefits are given prominent and detailed attention while the negative impacts and environmental costs are given scant regard. All in all this supports a narrative, which the developer clearly wishes to instil, of a project bearing gifts to the local community while glossing over its many and fundamental drawbacks.

Observation: The consultation documents present a superficial overview of environmental issues and impacts compared to relatively generous treatment of transport, jobs and accommodation. We believe this imbalance leads to a tendency for the consultation to focus on detailed, local and physical impacts at the expense of environmental degradation, habitat destruction, marine pollution, radioactive impacts and the long-term vulnerability of the site. Therefore, we urge the developer to conduct a separate Pre-Application consultation on environmental impacts when further analysis and information becomes available.

In the remaining part of this section we will comment on four key components of design and environment. These are: management of radioactive waste; the proposed arrangements for cooling; impacts on the marine environment; and impacts on terrestrial ecology, historic environment, landscape and environmental design.

(a) *Radioactive waste management*

The summary consultation makes only passing reference to spent fuel and radioactive waste, confined to a short statement under Other Information at the end of the document (p.28). Radioactive waste management fares little better in the main document where it is referred to on p. 15. The developer states that management of spent fuel will be in accordance with UK policy and regulation, that is, safely stored in an interim storage facility with a 100 years life design, extendable if necessary, awaiting final disposal in the GDF. The ILW arisings would similarly be stored on site pending ultimate disposal. To describe arrangements for storage for the next 150 years or so may be thought to stretch the meaning of ‘interim’ beyond credulity.

Earlier in this response we referred to the problem of the vulnerability to climate change impacts of a low lying and fragile site. Much more detail is needed on how highly radioactive wastes will be safely stored and what arrangements will be made to adapt to the increasing impacts of climate change.

We consider it would be unwise to plan for storage of these wastes on site now and in the future for three reasons;

1. In the medium term up until the end of the century highly radioactive waste stores are vulnerable to climate change impacts (and possible attack) posing a substantial risk to nearby populations.
2. Over the longer term ‘Predictions of potential climate effects become increasingly less certain the further into the future they extend’^{xii}. Beyond

2100, as we have shown earlier, uncertainty is indeterminate and conditions unknowable.

3. A permanent management route for these wastes may not be available. Government has proclaimed that it is satisfied 'effective arrangements will exist to manage and dispose of the waste that will be produced from new nuclear power stations'^{xiii}. It cannot be concluded that a GDF will be available for the disposal of Bradwell B wastes since neither a socially acceptable site nor a sufficiently robust scientific concept has been found and agreed. In any case, Bradwell wastes will not be available for disposal until well into the next century when storage conditions on the site will most likely have become intolerable.

The information on waste management provided in the consultation is extremely sparse and there are no firm or credible proposals for the longer term beyond the illusory prospect of permanent disposal. The consultation on the issue of wastes is inadequate and much more information is required.

We remain unconvinced that highly active radioactive wastes can be safely and securely managed in on-site stores indefinitely, in conditions deteriorating under the impacts of climate change.

Further, we do not believe plans for ultimate disposal are sufficiently robust, timely or certain to be considered as a long-term management strategy. The absence of a convincing and credible strategy for managing its highly active wastes is a fundamental reason for the Bradwell B project to be abandoned.

(b) Cooling infrastructure

Clearly a major problem with the Bradwell site is access to sufficient water for the reactor cooling system. It is evident that BRB has struggled to come up with an efficient, safe, cost-effective and technologically robust proposal for cooling which does minimum environmental damage. This is an extremely tall order and it seems impossible to produce a cooling infrastructure which does not inflict serious harm on the Blackwater environment and estuary.

BANNG has consistently argued that it will be difficult, costly and environmentally damaging to use either the shallow estuary or the sea for direct cooling. We have concluded that the problems of cooling are so difficult and destructive that building a nuclear power station of the size of BRB is technologically impractical and environmentally unsustainable. Having examined the proposals, this remains firmly our view.

The proposal appears to be a compromise between two alternative methods. The normal method of cooling for a coastal power station would be directly from the sea which is the approach being used at Hinkley Point C and proposed for Sizewell C. It is claimed that 'such direct cooling water systems can usually be designed with minimal environmental impact' (CD p.45). This claim has been vigorously challenged in the case of HPC where giant tunnels into the Severn estuary disrupt and destroy fish and may create environmental disturbance such as biofouling. Similarly direct sea cooling off the Suffolk coast for Sizewell C is being challenged.

It is evident that BRB has come to the same conclusion as BANNG, that direct cooling from the sea is not a practical proposition. It would require giant tunnels up to 11.5km. crossing the Dengie mudflats to access deeper water in the North Sea basin and outside the Marine Conservation Zone. This approach has been rejected, presumably for reasons of cost, engineering feasibility and security. One might conclude intuitively such a scheme would be absurd.

Regardless, the figures on p.47 of the Consultation Document misleadingly only compare the temperature gradient of the thermal plume from direct and indirect cooling systems as if both were abstracting and discharging into the estuary. The correct comparison would be between direct cooling from the open sea with indirect cooling from the estuary.

It is clear that direct cooling from the estuary is not an option for Bradwell B. This was used for the much smaller Bradwell A station. However, as has been pointed out countless times, the Blackwater estuary is shallow with a slow (ten days) refresh rate. The volumes of abstraction and discharge required to cool twin 1.1Gigawatt reactors, estimated at 130 cubic metres per second, is clearly well beyond the tolerable capacity of the estuary, and would impose intolerable burdens on the marine environment. This approach, equally absurd, has been rejected.

BANNG is pleased that BRB has responded to its long held concerns and has rejected direct cooling from the sea or estuary.

The solution to the problem appears to be a compromise between two alternatives. This is a pragmatic approach designed to deliver a cooling system that satisfies technical requirements while not being too offensive to the environment. The proposal is for 'indirect' cooling whereby water is evaporated in cooling towers and much lower volumes are abstracted from the river (estimated at a third the volume of the Bradwell A direct discharge). This has the claimed advantage that the thermal plume measured as the excess sea water temperature exceeding 2⁰C at the sea bed for no more than 2% of the year is confined to a small area compared to the much wider area the plume would cover if the water were directly cooled. The potential impact on marine ecosystems, fish, crustacea and especially the protected Colchester Native Oyster (*Ostrea edulis*) would be much reduced. However, it should be noted that heating above 2⁰C even for half an hour a day could be deadly to small organisms; in fact the period of exposure is likely to be longer since high temperatures will likely occur in spikes rather than evenly spread throughout the year.

Although indirect cooling may seem an elegant solution to an almost insoluble problem of cooling water supply, it has drawbacks and disadvantages:

1. In the first place, indirect cooling reintroduces cooling water to the estuary that warms, pollutes and harms the marine ecosystem. Since the former station closed in 2002 the estuary has not been inflicted with contamination from power station discharges apart from the unfortunate episode of Fuel Element Debris (FED) from the experimental and aborted dissolution process successfully opposed by BANNG (see BANNG papers 21,24,26,31). BRB is

now proposing to discharge warm water and pollutants into an estuary that is relatively pristine and abundant.

The claim that the discharges into the estuary will be one third lower than those from the former nuclear station is disingenuous and gratuitous. It suggests the new station will bring improvement when in fact it will introduce a new and potentially harmful detriment.

2. Since the closure of the former power station, the Blackwater, Crouch, Roach and Colne estuaries Marine Conservation Zone (MCZ) covering 110 square miles (284 sq. km.), has been established. It is the largest inshore MCZ in the country and among the first to be designated (2013-2016). The purpose of the designation is to recover and maintain favourable conditions for cultivation of the Colchester Native Oyster. This oyster has a high reputation and is of historical and cultural significance. The Consultation Documents recognise its importance and the potential harm that cooling proposals for Bradwell B will introduce. Hence the decision to undertake a scientific assessment of impacts of the proposals with the University of Essex.

The designation of the MCZ to protect the Colchester Native Oyster is a major constraint on the BRB cooling proposals. The aims of the research proposed must be made public, together with information of the supervision, scope, methodology and peer review processes. In the interests of transparency and openness, the outcomes of the project must be available for stakeholder and public inspection. Most importantly, the risk assessment to the oyster and other marine life must be clearly expressed and explained.

3. Cooling towers are an integral part of the indirect cooling system. The developer recognises that the ‘massive scale and height (up to 180m.) and highly visible plume of water vapour would give rise to unacceptable levels of impact’ (p.48). Instead, the scheme proposed offers the prospect of six rectangular towers or its preference for two circular towers. These would be fat and squat erections, 120-165m. diameter and 50-60m. high, similar in height to the main buildings on the nuclear island. The visual height will be accentuated as they would also stand on the raised area on which the station would reside. They would be very prominent features on low-lying ground close to the Blackwater, creating considerable amenity damage within the overall scene from various viewpoints as the pictures in the documents illustrate. The sense of height would be increased by the plumes created by evaporation from the crown of the tower. It is stated that ‘the plume would only be visible for 5% of the time as an annual average and would be visible for 10% of the time during the winter (Nov-Mar)’ (p.50). It is very unclear whether this refers to daylight hours only; in any case, the impact in winter is likely to be considerable. It is recognised that plume visibility will be of ‘significant interest’ to public and stakeholders and that further detailed investigation is necessary.

The Consultation Document does touch on some of the additional issues of hybrid cooling towers, including salt drift, but there are further questions about

reliability. These include: icing; the need to purge build up of biota and marine ‘sediment’; plus the need for constant power to drive the fans, as yet unspecified but could be as high as 1-1.2% of the power output.

Cooling towers tend to dominate flat landscapes and their looming presence is emphasised by the height of plumes visible from all directions. On the Blackwater estuary they will create immense amenity damage and are quite out of character with the low-lying landscape of rivers, mudflats and creeks; a haven for wildlife and place of recreation and pilgrimage with the ancient St Peter’s Chapel and Othona Fort as features in a quiet landscape. The cooling towers compound the offensive and alien intrusion of the gigantic power station complex into a cherished landscape with surrounding sea and estuaries. The hybrid cooling system proposed in the consultation, intended as a compromise, adds insult to the estuary and injury to the landscape; truly the worst of all worlds.

(c) Impacts on the marine environment

The Blackwater estuary is important for its marine ecology and for its commercial fishing industry and famous oyster cultivation. It is also fringed by intertidal marshes and mudflats which are important habitats for a rich variety of birds, mammals and marshland flora. It is a significant recreational area with beaches, sailing, wind and kite surfing, coastal footpaths, nature reserves and country parks. The estuary has various designations, SPA, RAMSAR, SSSI, NNR, as well as the extensive surrounding MCZ. The Bradwell B proposals would inflict serious environmental harm on the marine ecology and surrounding marshland habitats and would introduce disturbance, destruction and amenity damage that would have a deleterious impact on the wellbeing of communities right around the estuary.

The Consultation Document sets out design principles whereby it is intended to address or mitigate harmful impacts. These include: ‘Respect the outstanding marine biodiversity of the Blackwater Estuary’. There is, understandably at this early stage, little detail of how ‘giving special attention to the local marine sensitivities’ may be achieved. We must await the Environment Statement based on the Habitats Assessment, together with the outcome of the BRB/Essex University research project, to gain details of the specific harms and how they might be avoided or mitigated. Clearly much is in the ‘initial’ stages in the form of generic ideas and strategic overviews and this supports our view that, in several respects, the Pre-Application Consultation is premature, lacking in firm proposals and details on which to base a constructive response. However, there is enough information on general intentions to support our conclusion that,

the overall impact on the estuary is on such a scale that the existing tranquil, passive, fragile and unpolluted environment of the Blackwater would be replaced over time by a noisy, industrial, dangerous and intrusive complex.

There are three areas of impact on the marine environment which are of particular concern. These are: pollution from the cooling system proposals; impact of marine transport and infrastructure; and amenity damage from power station structures and cooling towers.

(i) *Impacts of marine pollution*

A major reason for objection to the Bradwell B proposal is the danger it poses to marine ecosystems through the intake and discharge of cooling water. Clearly, BRB is sensitive to this issue and has responded by introducing a hybrid cooling system which requires much lower volumes of water and by commissioning a research project on impacts. BANNG will be interested in the views of other stakeholders, including oystermen and fishermen, as well as the outcomes of research. We note the shallow nature and slow refresh rate of the Blackwater and the opinion, with reference to the former station, of the Habitats Regulations Assessment of the NPS statement for Bradwell that, ‘The River Blackwater is over-abstracted’^{xiv}. Cooling water abstraction and discharge heats up the water which harms crustacea and other organisms. There are dangers of entrainment and entrapment of thousands of fish entering and passing through the tunnels. Fish damage and death will be caused by the mesh screens installed to prevent fish entering the cooling system but smaller fish, juveniles, eggs, spawn, spat and micro-organisms will pass through the mesh entering the cooling system where they will be subjected to sudden pressure changes, damaging or bursting swim bladders and other organs, sudden temperature changes of tens of degrees, mechanical impacts from pipes and heat exchangers and perhaps exposure to biocides designed to keep the pipework clear of marine growth. When Bradwell A was operating the sea bed was scoured, bleached and barren for a mile and a half both upstream and downstream of the intake and outlet pipes near the Bradwell shore.

The Essex Native Oyster Restoration Initiative (ENORI) project is currently under way and six spat (oyster egg) collector frames have recently been deployed 500m offshore near West Mersea as part of this. The effort to protect and improve the environment of the Native Oyster may be jeopardised by the demands of the power station’s cooling system.

The proposals seek to minimise the impacts of the cooling system by indirect cooling which reduces the volumes of water required and reduces the thermal plume (the area of excess sea water temperature). However, damaging impacts will not be removed but will cause a deterioration in the conditions of the estuary that will endanger fish and oyster beds. Any damage to this precious environment and protected species must be avoided.

(ii) *Impacts of marine transport and infrastructure*

Developing a mega nuclear power station is a transport-heavy activity. The number of HGV movements, rail shipments and car journeys in association with the development constitutes a major environmental issue which creates problems of pollution, congestion, amenity damage and nuisance for communities on the Dengie Peninsula and beyond. In order to alleviate the impacts on roads, it is intended to provide bespoke marine transport facilities to carry bulk materials, components and other cargoes which are difficult to handle by road. The facilities comprise a beach landing facility taking very large components for infrequent use, and a facility for taking in aggregates and other cargoes during peak construction. One would be shore-

based and the other includes options of a jetty, marine offloading facility and an aggregates pipeline.

There are concerns about the damage to the seabed through piling and construction of jetties protruding a third of a kilometre into the estuary. Building such structures will inflict damage on breeding grounds and impact on spat sensitive to environment.

Another main concern is the volume of marine traffic that would be generated and its potential interference with existing activities including sailing in this very popular estuary with several marinas and mooring facilities. The proposed jetty and landing facility provide for a small port on the Blackwater which introduces problems of fouling, noise and general interference with other activities. Large diesel-powered ships with bulk cargoes will be moving in and out of the mouth of the estuary which is an area mainly dedicated to sailing and racing with major regattas and other events. On both sides of the estuary are popular beaches used by holidaymakers.

We consider that the introduction of port facilities at the Bradwell site will create interference with recreational and sporting activities, including yacht and dinghy racing, leisure craft, surf boarding, kite surfing and swimming. Movements of larger ships will create turbulence, possible oil spills, pollution, noise and danger. BRB should provide an analysis of impacts and accident scenarios and indicate more clearly how it is intended to prevent or mitigate the consequences and to protect and conserve the marine environment.

(iii) Amenity damage from cooling towers and power station

In its response to the first round of consultation on the NPS ten years ago the Government made the observation that, in the event of cooling towers, it would be necessary ‘to judge whether the visual effects on sensitive receptors... outweigh the benefits of the project’, noting that, ‘this area is flat and predominantly undeveloped’^{xv}. NPS EN-1 states: ‘The scale of such projects means that they will often be visible within many miles of the infrastructure’ (DECC, p.100)^{xvi}. The Consultation Document argues that traditional ‘natural draft’ cooling towers of circa 180m. with highly visible plumes ‘would give rise to unacceptable levels of visual impact’ (CD p.48). The proposal is for indirect cooling which means lower profile cooling towers are possible, though still at considerable height (up to 60m.) and plumes would be less frequent and less visible. The implication is that whereas traditional towers are unacceptable, hybrid towers will blend more readily into the landscape and the reduction in visual amenity will be minimalised. The fact is that these towers will not be invisible and will present a dominating and intrusive presence in an exposed location for miles around.

Similarly the power station complex of reactors, turbine halls, waste facilities and other buildings plus some of the landscaping features, though massed at the western end of the site, will still be highly visible and a blot on the landscape. The proposals seek to prettify the complex by ‘giving careful consideration to the composition of larger elements, including the relationship of the new development with the existing Bradwell power station: and integrating design work with early landscape and visual impact assessment’ (CD p.74). The overall aim seems to follow the Keatsian principle of ‘A thing of beauty is a joy for ever’.

No matter how prodigious the effort to provide an attractive structure blending in with the landscape, there is no escaping the colossal amenity damage of introducing massive structures into a landscape which will effectively be destroyed. The aim to ‘Be sensitive to the distinctive visual setting of the Blackwater estuary’ will be terminally compromised whatever is done. The massive intrusion into the landscape cannot be avoided and is a major reason why BANNG believes the Bradwell project as a whole must be rejected.

(iv) Environmental Impact of Cooling Towers

In changing from direct to indirect cooling, there is a substantial change in the effect on atmospheric conditions, since heat from the condensers normally discharged to sea is now mostly entering the atmosphere. This will have a major impact on the local area and that intrusion is not clearly identified in the consultation document.

According to the documentation issued, the evaporation loss from the cooling tower(s) is 2m³/s. For base load operation this results in emissions of over 172 thousand tonnes of water vapour per day and therefore 63 million tonnes of vapour per annum. No attempt has been made to demonstrate the effect of this on the local area. While it appears that scientific studies have been made on the estuary itself, no such investigations have been made on atmospheric conditions. There is a need to present clear scientific investigations showing especially potential plume dispersal and visibility. Also the possibility of plume inversion needs to be investigated under various atmospheric conditions.

It is noted that there is the potential for salt carry over (drift). Again nothing is presented in relation to what quantities are expected, where that will be deposited and the environmental impact of such deposition on buildings, equipment and the surrounding countryside.

With the substantial evaporation of sea water, there will be the strong possibility of salt deposition within the structure of the cooling towers, depending on the design. In the case of the single low level design it would not be possible to shut down for cleaning purposes. How will salt deposits be removed and what will prevent excessive salt drift during cleaning while in operation? No explanation has been offered.

When the sea water is evaporated, it is suggested that 7m³/s will be returned to the estuary. This must mean that this quantity of water will have increased salt content above that entering the system from the sea. Nothing has been presented regarding investigation of the effect of this on the estuary conditions.

It is well known that Legionnaire’s Disease has been associated with the use of cooling towers. No mention has been made of this issue in the documentation and therefore this represents a major failure in communication with the public.

There will be a substantial risk of noise emitted by the cooling tower fan system. This has not been mentioned in the consultation document. This issue needs to be quantified as it is likely to be one main cause of noise pollution local to the plant, possibly above all other background noise issuing from the power station itself.

All of the above issues indicate that there is a severe lack of communication with the public regarding numerous serious environmental issues related to the intended cooling process that have not been presented openly for general consideration.

(v) *Plant Efficiency and Cost Impact of the use of Cooling Towers versus Direct Cooling of the system.*

The introduction of indirect cooling for Bradwell B raises the issue of the effect of this on thermal efficiency of the plant as a whole. Direct cooling will minimise condenser cooling water temperatures which results in maximum thermal efficiency. Cooling towers can only achieve cooling water temperatures which are related to that of the surrounding atmosphere at a given moment in time. Generally this will seriously reduce plant efficiency and consequently the amount of electricity generated. In summer in particular, when atmospheric conditions are warm, this will have a major impact. The use of fans for the towers will increase auxiliary power usage when compared with natural draught towers, again reducing plant efficiency.

In other words, assisted draught cooling towers will cause the cost per MWh generated at Bradwell B to be higher than that of a similar directly cooled plant e.g. Hinkley Point C. It stands to reason that Bradwell B cannot be commercially competitive against similar direct cooled units under such circumstances. The cost per MWh generated will undoubtedly have to be above that of Hinkley Point C, already at an extremely high level of £92.5 /MWh generated.

This has not been identified at all in the consultation document, again effectively keeping this very important fact from public knowledge.

(d) *Impacts on terrestrial environment*

(i) *Landscape and environmental design*

We have covered some of the issues earlier in this response. We recognise that some aspects are only at a very early stage of development and are awaiting the Habitats Assessment and Environmental Statement. BANNG's response is, therefore, in terms of general principles and overall impacts and lacks the expertise to provide detailed analysis of specific impacts which other stakeholders will provide. We intend to deal with some specific issues in our response to any consultation undertaken by the Environment Agency or by the Government's forthcoming consultation on the revised NPS. At this stage we are most disappointed at the brief and inadequate treatment of ecological and environmental issues in the Consultation, which further indicates the prematurity of the process. We believe the developer must undertake a further consultation when BRB is in a better position to provide more information, knowledge and proposals concerning environmental impacts which are issues of profound concern to stakeholders and communities around the Blackwater estuary.

There are several design principles relating to environment, including: 'Protect the rich biodiversity and ecology of the Dengie Peninsula'; 'Protect the amenity of our neighbours and local communities'; 'Respond to the distinctive landscape character of

the Dengie Peninsula’; ‘Respect the history and setting of local heritage assets’; ‘Protect recreational use of the Estuary and Peninsula’ (CD p.75). We note the general approach to design, conservation and heritage that is intended. We applaud the noble aspirations implied in the principles. Our response is that principles, however well meaning, can only be transformed into practice by working within the constraints of the environment. As we have stressed several times in this response, the proposals represent a total transformation of the existing environment, landscape and heritage. What is on offer is a replacement; a quite different transformative, industrial landscape.

Whatever efforts are made in mitigation, conservation or preservation are simply unachievable. It is not possible to have both chalk and cheese. In view of the fact that it is literally impossible to meet the design principles in any form of alternative design, it is futile to aspire to them. BANNG believes the environmental deficits that Bradwell B would bring are comprehensive and constitute a reason for rejecting the whole proposal.

(ii) Damage to the historic environment

The Dengie peninsula contains a rich archaeological heritage and a range of historic buildings and other features from various periods. Some of these, notably St Peter’s Chapel and the Othona fort, are of incomparable significance. The RAF Bradwell Bay airfield with landing strip, control tower, bunker, and buildings including aircraft storage buildings, constitutes a precious legacy from World War 2. The area has important heritage sites, including listed buildings and rich archaeological finds from Roman, Saxon and Medieval periods. The landscape contains grazing marshland recovered from the sea from the late Middle Ages onwards. It is a rich and precious heritage set in a marginal and fragile context. Local planning policy is committed to conserve and enhance the historic environment. Substantial harm to designated heritage assets must be avoided.

The impact of the proposed development on the heritage development of the Dengie would be devastating. Destruction of fragile assets within the site would be almost impossible to avoid. The impact of a massive, industrial complex on a rural, tranquil, low-lying, understated landscape would be transformative. It would be impossible to conserve and the loss would be irrecoverable. The wild, spiritual isolation and modest scale of the area outside the site boundary containing St Peter’s Chapel would be juxtaposed with the jarring and discordant mass of the nuclear station.

Development of this site might reveal the richness of the heritage present there thus reinforcing the case for conservation and enhancement. However, while some individual assets might be conserved, the wholesale destruction of the Dengie’s landscape and environment would be unavoidable. On these grounds the planning application should be rejected.

(iii) Damage to Ecology

The site and its landward surroundings contains five designated areas – Dengie Ramsar, Dengie Special Protection Area, Blackwater Estuary Special Protection Area, Blackwater Estuary Ramsar and Essex Estuaries Special Area of Conservation. In

addition, there are nearby, the Dengie National Nature Reserve and the Blackwater Estuary SSSI. The area is a fabulously rich and precious complex of ecosystems, including salt marshes, reedbeds, ancient grazing marshes and deciduous woodlands and provides an abundant environment for native and migratory birds, fauna and invertebrates. The saltmarshes alone contain ‘outstanding assemblages’ of rare flora and the area supports nearly 7% of the world’s overwintering Brent Geese. Many examples of important species are cited in the Ecological Appraisal.

The Consultation Document indicates there will be detailed appraisal of the measures that would be taken to minimise disturbance and disruption on the site and to conserve the ecology and environment. Meticulous attention to detailed conservation, for example, by employing ornithologists and ecologists to ensure adequate protection of Bearded Tits, are among the methods intended to ensure the integrity of the site is maintained or restored. While this is commendable and necessary to defend the site against the intrusive works, it demonstrates the scale of destruction that would be caused if the power station were to be constructed.

In terms of the comprehensive ecological damage that will occur it is difficult to conceive of any circumstances in which permission to develop should be granted and, therefore, it follows that the proposal for a new nuclear power station should be rejected.

Part 4 People and Jobs

According to the Consultation Document the major benefit of Bradwell B is found in the economic benefits it will bring in the form of jobs, skills, investment and wellbeing for the area. The language extolling the benefits is unrestrained. The project would ‘deliver long-lasting benefits’.. ‘creating tens of thousands of jobs’..and would be ‘transformative, on a scale not seen in this area since the existing Bradwell power station was built’(p.126). Overall, Bradwell B will ‘Deliver economic and social outcomes that help raise aspirations and local opportunities’ (CD p.127). Reference to the adverse economic and social impacts is more subdued. There is talk of ‘making significant effort to also understand any potential adverse effects’ (p.126) whereby mitigation ‘would be agreed as part of the consenting process which secures commitments and funding as necessary’ (p.127).

Bradwell B would, most certainly, be transformative both in terms of its massive physical impact as well as its profound economic and social effects on the sub-region. It may be questioned whether the so-called economic benefits are, indeed, beneficial. Certainly the benefits, in so far as they exist, are by far outweighed by the economic, social and environmental disbenefits and disadvantages of the Bradwell B project.

In the broadest terms, Bradwell promises a particular model of economic development, based on investment, infrastructure, employment and growth. It is unclear why the jobs would be especially valuable in a rural area which is relatively prosperous and has a mixed economy than in, say, a declining industrial area where economic regeneration is needed. The introduction of a major development with a very significant employment growth in the Maldon/Dengie area is bound to have a distorting effect in housing, inequalities, services and environment. It requires rapid adjustment towards a more monocultural economy and away from a

balanced economy based on services, tourism and small and medium sized industries. Nor, if development here is necessary at all, is it clear that nuclear is necessarily the only alternative source of employment; other energy developments, for instance the wind farms developing on and around the Essex coast, might also provide a source of continuing jobs. It might be argued that introducing new nuclear in a rural area could create an economy with an unhealthy dependence on one employer. The Bradwell project will significantly restructure and imbalance the local economy away from one that is balanced, diversified and resilient.

Much more information is needed on the transformative impacts on the economy and community from a new nuclear power station. Issues of balance, diversification, inequality and employment should be addressed. The monocultural economic model implied for Bradwell B should be compared to other models of economic development, regeneration and diversification that might be applied to the region.

The impact of Bradwell B on jobs will be very substantial in terms of numbers, nature and impacts of the workforce.

- *Total workforce.* It is estimated that, at its peak of construction, the new power station will have a maximum of 10,600 workers on site though 9,100 is a more likely figure over a peak period of around three years. Once the power station becomes operational there will be an estimated 900 permanent workforce over its sixty years lifetime and a declining workforce during the long period of decommissioning thereafter.
- *Nature of workforce.* During the early years there will be high numbers of mainly temporary, itinerant workers and around 3000 recruited from the local area. The bulk of the workforce will come from other parts of the UK and abroad, some, it is expected, from the Far East. This is a substantial number for which accommodation, transport facilities and services such as health and education will be required. High employment during the years of construction will stimulate the local economy but at a cost of a burden on its services. It is intended to develop an investment strategy to provide skills and to create opportunities and sustainable employment for local people. The intentions are commendable but much more detail is required on implementation.
- *Impacts.* The disbenefits of such a huge influx of workers may be underestimated. An economy tilted towards one dominant industry will inevitably impact on labour markets and is likely to have distorting effects on other activities. The generally higher wages and skills in the nuclear industry may reveal and create disadvantage and inequalities in the existing workforce. The sheer scale of the workforce for the power station may act as a deterrent to inward investment, impacting negatively on existing economic activities and creating a blighting effect. We consider it is not sufficient simply to assert the benefits of job creation and ‘the step change in opportunities for local people, businesses and local communities’. It is necessary to undertake appropriate analysis to determine the overall potential economic benefits and detriments.

It is acknowledged there may be adverse effects on tourism but the proposals for addressing them are vague and vacuous, suggesting local road improvements on the Dengie and a visitor centre at the power station might enhance visitor numbers. There might also be mitigation 'if needed' to protect tourist accommodation from over-demand by construction workers. The scale of the project and its damaging impact on environments and amenity will inevitably wreck the very attraction of the Blackwater area as a place for passive recreation and low profile holiday making of caravans and beach huts. For residents and visitors alike the immense scale, noise, visual intrusion and loss of amenity will have impacts on wellbeing that are difficult to calculate but easy to contemplate.

Before proceeding further with proposals for Bradwell B there should be an independent study and assessment of the economic, psychological and social impacts on the communities surrounding the Blackwater estuary. This Social Impacts Assessment should be seen as complementary to the Habitats Regulations Assessment and subject to consultation.

Part 5. Accommodation: overall approach

At peak construction, a period of three years or more, a workforce of around 10,000 will bring a massive inflation in jobs in a predominantly rural/market town area with significant ramifications for jobs and housing markets. The problems of accommodating and integrating this working population include the following aspects: origin and distribution of workers; demographic characteristics; and types and location of accommodation.

- *Origin and distribution:* It is estimated that about a third of the peak workforce will be recruited locally and, therefore, be relatively settled. The majority, adventitious workers, will come from other parts of the UK or from abroad. It is unclear where recruitment will occur and if there will be particular target areas such as the Far East. No doubt some will be itinerant workers moving from projects such as Hinkley Point C or, if it gets started, Sizewell C. During peak development, the majority will be engaged in construction work with a variety of skills. There will be a skills strategy to provide opportunities for sustainable employment. While it is intended that most of the construction workforce will live near the site, some workers will be living within an ultimate radius of 90 minutes travel time. The project will have a regional impact with part of its workforce living at some distance away. Accommodation, transport and other facilities will need to be provided for the duration of construction.
- *Demographic characteristics:* The consultation provides only a sketchy idea of what the demographic composition of the workforce will be. It may be inferred that, during construction, the workers will be young, predominantly male and single, semi-skilled from a variety of regional and ethnic backgrounds. Given this demographic we should expect disproportionately less demand on educational, health and social services with a relatively high demand for sporting, entertainment, leisure and hospitality services.

A more detailed analysis of the workforce composition and its potential impact on services is needed.

- *Accommodation:* The large workforce, especially at peak construction, will require various forms of accommodation, both temporary and permanent. There will be impacts on the existing housing market spread over a wide area as well as a need for additional accommodation, some of it purpose-built.

The impact on the housing market is very difficult to predict. There will be structural uncertainties as well as local impacts reflecting different segments of the sector. The Bradwell project envisages an interventionist strategy including a Housing Fund which could provide new housing, bring back empty homes into the market and provide assistance for such things as downsizing, provision of spare rooms, and financial assistance. Such interventions are likely to have only marginal impact on the overall housing market. The question of localised impacts on property prices is difficult to assess. It is possible that residential property values close to Bradwell might be elevated by demand from the power station; equally the massive impact, disturbance and danger imposed on local villages might depress property values. On the north side of the estuary where diminished amenity and risk will be experienced it is possible that these locations could become less favoured resulting in a lowering in property values.

During construction it is anticipated that some of the workers will be accommodated in caravans, hotels and bed and breakfast accommodation. However, almost half of the peak construction workforce (4500) will be provided with purpose-built, campus-style accommodation in six storey residential blocks. These will be located close to Bradwell village and Bradwell Waterside adjoining Bradwell A. A range of facilities will be provided to make the accommodation relatively self-sufficient. We have no comment to make on the precise layout and proposed location except to say that it is sufficiently close to the two village settlements to prove overwhelming. Indeed, the population in the immediate vicinity of Bradwell will increase by around 700% during the period of construction. Close proximity of workers' accommodation and hitherto peaceful villages will fundamentally alter the demographics and could have a deleterious effect on the community's wellbeing.

There should be an assessment of the impacts on services, social integration and community wellbeing arising from the need to accommodate the Bradwell B workforce. The Social Impacts Assessment we have called for above should set out the problems, opportunities, capacity constraints and strategies for managing the rapidly changing demographics in the Dengie that will occur during the years of construction of Bradwell B and beyond. We consider this to be a major challenge requiring cooperation with authorities and consultation with the public.

Part 6 Transport: overall approach

Transport takes up a substantial section in the consultation document, far more than is devoted to environmental and ecological issues, for instance. The detailed proposals and options for transport must not seduce people into the idea that Bradwell B is *fait accompli* and therefore the focus of attention must be on the detailed implementation of the project. Getting respondents to focus on such details as a by-pass for Latchingdon or optional locations for Park and Ride may easily divert attention from the bigger picture which is the impact of transport as a whole. This approach is tendentious, whether deliberate or innocent, and supports the overall narrative that the die is cast and it is the implementation that is up for consultation and advice. We have already stated that, in view of the comprehensive damage and irrevocable impact that Bradwell B would impose on an unsustainable site, the proposals as a whole should be withdrawn. **Therefore,**

The overall impact of the transport proposals on the Dengie peninsula and beyond and on the Blackwater estuary will have a damaging impact on environments and communities and constitute a substantial and contributory reason for withdrawing the Bradwell project.

The scale of these negative impacts is recognised and cannot be denied. Attempts at mitigation can redistribute but not remove problems of congestion, parking, land take, noise or disturbance of waterways. For instance, in the effort to reduce HGV movements, port facilities are proposed which shift some of the burden from the roads on the Dengie to the Blackwater as a seaway. We have commented on the impacts of port infrastructure and shipping movements earlier. **Here, we would observe again that shipping and docking facilities introduce large infrastructure, interference and potentially new forms of regulating and restricting sea traffic. It also introduces pollution, ecological and amenity damage on a substantial scale.**

The transport strategy for movement of the workforce, particularly the 9000 and more workers at peak, is sensible and potentially feasible. By accommodating around half the workforce close to the plant, longer journeys to work are minimised. Plans to secure a modal shift from cars to cycles and public transport with Park and Ride respond to modern considerations of sustainable transport. Proposed road improvements, in the form of by-passes, etc. should also relieve villages from Bradwell commuter traffic. However, there will still be substantial increase in journeys using a network of roads and country lanes some of which are not fit for purpose for commuting. Bradwell is far from strategic roads and a major link across the Dengie could not be contemplated on grounds of cost and environmental impact. As it is, the road improvements proposed, while bringing relief to some, are likely to cause local environmental issues for others.

Haulage of freight by HGV over the long distances from the strategic road network or rail/road interchange at Chelmsford presents a major environmental nuisance from pollution, noise, danger and impact on environments. The estimated 500-700 two-way HGV movements on average throughout the day during peak, managed through a freight management facility, constitutes a massive burden of heavy traffic through a rural area. The estimate presumably assumes 50% of freight movements will be by sea. Should the port facilities be delayed or not constructed then the HGV

movements will be considerably higher. There will also be considerable movements associated with grid improvements, off site construction and road building. To describe this as ‘residual highway impacts’ (CD p.108) is risible especially when set against the various community and environmental sensitivities listed in the consultation document.

Transport is likely to be a major issue for the communities impacted by Bradwell B. The transportation strategy anticipates this and has gone some way to seek to mitigate impacts and improve circulation. More detailed estimates allowing for different scenarios are needed in the traffic modelling to get a comprehensive picture of estimated loads. But, there can be no hiding the fact that the harm to environments and wellbeing will be substantial and that the scale of transport impacts contributes to the reasons for refusal of the project as a whole.

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