

BIRD ISLAND EIA REVIEWER FEEDBACK

September 2017

Commented [A1]: All BAS responses to questions and comments are detailed in the greyed out boxes or within specific comments. Where appropriate, changes have been made in the EIA in response to questions and this is highlighted in each individual reply. 27/10/17

Reviewer 1

General comments

The purpose of an EIA is to identify the outputs from an activity, operation or process that will (positively or negatively) impact the environment and to identify ways either to eliminate or mitigate (or in some cases 'offset') the negative impacts.

The planned work at Bird Island is relatively straightforward. Although one or two planning details have yet to be finalised, the EIA presents a thorough description of the rationale for the proposed work and what it will entail.

The long period of operation of the station means that much is known about the existing environmental state and this is described in good detail in the EIA.

The planned work is constrained in both space and time. Activities will be limited to the beach area in Freshwater Inlet, largely within the current footprint of the station, and (if all goes to plan) the work will be completed within a four-month window. Consequently, the outputs from the planned work that have potential to impact the local environment should be relatively straightforward to identify, and the EIA has done so.

We have not identified any major gaps in the assessment and no notable environmental impacts appear to have been overlooked.

The alternatives to the proposed activity are reasonably well characterised and include an appropriate range of options, including relocating the research activities to another site entirely. The rationale for remaining at the existing location is sound if a little briefly made.

The mitigation measures to minimise the identified impacts seem appropriate and the management plan, checklists and monitoring plan that are appended to the report provide confidence that the work will be carefully managed in practice. The monitoring plan provides further reassurance that predicted impacts will continue to be assessed on site and that 'real time' adjustments to the activity will be made based on collected information.

We also agree with the conclusions of the EIA that the overall environmental consequences are likely to be relatively minor and acceptable, and will be outweighed by the benefits of redeveloping the station (not least in maintaining the globally significant research undertaken at the station).

Specific comments

The specific comments that we have on the EIA are more to do with the document itself, rather than its overall findings in relation to the redevelopment work.

The most substantive comments relate to Section 7 on Impact Identification & Mitigation Measures. A thorough risk assessment is an important component to any EIA in that it helps to identify those impacts that are likely to be of most concern, and thus where mitigation effort should be prioritised.

The EIA applies what is essentially an environmental risk assessment process, though without actually saying so. And the process that has been followed (ostensibly to “rank impacts prior to mitigation” (page79)) is quite rudimentary. We would have expected to see a more robust methodology used with clear definitions provided for the likelihood and consequence of an impact occurring (the terms probability and significance (sometimes ‘severity’) are used in the report) and with a risk matrix included to allow comparative levels of risk to be applied to each of the identified impacts. Without assessing the environmental risk of each potential impact, the intent to “rank impacts” has not been achieved.

BAS RESPONSE:

I have reviewed the definitions for both likelihood and significance and provided a more detailed definition. The process used to assess likelihood and significance is qualitative and based on professional judgement and knowledge and the information provided in the EIA. The environmental risk for each impact has not been assessed as suggested, as providing a score or figure to each impact could distract or distort from the qualitative assessment.

See update in EIA – section 7.

No definitions of probability (ideally ‘likelihood’) are provided in the report and the definitions for significance are quite broad. Equally the impact matrix (Table 9 on page 89) is a little hard to follow in that it is not clear whether the probability and severity values are being applied with or without the control measures in place. The impact matrix (Table 9) could also benefit from inclusion of an additional column to show the overall risk rating for each impact.

BAS RESPONSE:

Definitions of likelihood and significance have now been provided as described above.

Section 7.3 now explains that the likelihood and significance values are applied without the mitigation measures in place.

As described above, we have decided against using an overall environmental risk score for each impact as it can detract from the qualitative assessment of the

impacts. If GSGSSI however consider this would improve the assessment then we can look at including it.

Further, section 7.1. sets out the 'Potential Impact' and 'Mitigation' for each of the key elements of the project. This too could have been improved by adding a summary of the environmental risk each impact is likely to have.

We would like to have seen a little more emphasis placed on pre-deployment training of the construction crew to ensure that they fully understand the nature of the environment they will be working in and the control measures that are being applied to the work. Pre-deployment training / guidance is alluded to in the EIA, but we would encourage BAS to establish a thorough pre-departure programme for the construction crew. A well briefed construction crew is a mitigation measure in and of itself.

BAS RESPONSE:

BAS has provided training to the BAM construction team through the following means: annual BAS pre-deployment training, oil spill response training, specific Environmental Induction with a focus on the BI EIA. All BAM BI construction crew have signed a declaration to confirm they have attended and understood the Environmental Induction.

See update in EIA – section 3.7.61

On a similar point, one of the mitigation measures to avoid possible damage to heritage or sites with historical importance (page 81) is to ensure all construction workers are briefed on the presence and importance of heritage sites. We would suggest that controls on the travel of construction workers across the island would be worth considering; for both environmental as well as health and safety reasons.

Section 9 on Gaps in Knowledge and Limitation, was a little light. This section might have been retitled 'Gaps in Knowledge and Uncertainties', which may have helped to identify some additional considerations such as potential delays in the project due to shipping timetables, severe weather, or equipment loss / malfunction for example. What if poor weather conditions mean that the work cannot be completed by the end of May? Can it push into June or will completion of the project need to be delayed until the following summer? And what are the implications of such a scenario?

BAS Response:

This has been considered in Section 9 of the EIA.

The limited attention to climate change issues was surprising. We accept that no climate modelling has been done specifically for SGSSI, but we would have expected

BAS, with all of its local knowledge and ongoing climate related work in the region, to be able to provide some climate change context for the EIA. BAS research has identified signals of changing conditions in the region and DEFRA's climate vulnerability assessment for SGSSI (published 2012) might have been worth a mention. It is also likely that under ongoing sea level rise scenarios the Bird Island station has a finite lifetime at its current location; though that is probably well beyond the current lifetime of the planned new infrastructure.

The lack of reference material throughout the document is unusual. Whilst a few references are listed, they are not included in the body of the EIA and so it is impossible to know the relevance of the references. But we would have expected far more citations to support the information provided in the EIA, not least when describing the existing environment.

BAS Response:

This has been considered and some context provided related to projections made in the SCAR's Antarctic Climate Change and the Environment (ACCE) Review Report (2009). See EIA section 5.12.

In a similar vein, the section on current scientific research being undertaken at the station (section 4.3.1. on page 50) is short. A more comprehensive overview of the research being undertaken and its significance (with references) would have helped to reinforce the importance of undertaking the redevelopment work. This need not be exhaustive, but a more thorough synopsis might have been helpful.

BAS Response:

Please see updates in Section 4.3.1. for some additional information and links to BI science research projects.

Additional editorial comments are included in the EIA itself.

Summary

The concerns with the document that are noted above should not detract from our overall assessment that the EIA adequately identifies the key environmental impacts that are likely to arise from this redevelopment work, and sets out appropriate mitigation measures.

The work will be constrained in both space and time, which will in itself limit the potential impacts. BAS know the local environment very well which helps to characterise the impacts. This local knowledge has also informed a well-designed monitoring programme.

We would have no difficulty in recommending approval of the activity based on the current EIA as presented. The extent to which G-SGSSI may wish to see some aspects of the EIA revised can be discussed. Revising the EIA to address the points raised here and in the EIA document itself, would not be a huge undertaking and would improve the EIA as a document. However, the changes would be unlikely to materially change the key findings and outcomes.

Reviewer 2

General Comments

Although very thorough, at 180 pages this document is too long, repetitive and goes into unnecessary detail on the history, geography, geology, and biodiversity of the island. Much of the first half of the document is spent reiterating details from the original BAM documents found in the appendices. An environmental impact assessment should be detailed but easily referenced. The length and repetitive nature of this document makes it unwieldy to use and difficult to search for details.

The comments in the document regarding temporary storage of cargo in the Falklands raise the question of biosecurity. Whilst items may be packed in biosecure facilities and stored in the Falklands in a biosecure facility, the transit of cargo from storage area to ship may provide opportunity for contamination. This is especially true for large cargo quantities and large volume items which may be deposited on the wharf area prior to transport or loading rather than being loaded directly to the vehicle.

Specific comments

Seals:

Although the works will be conducted outside of peak fur seal breeding season many pups will remain well into the work period. Mobile temporary fencing may be considered to segregate potentially damaging items such as demolition waste which is to be stored on the beach and may have sharp edges and nails.

It has been noted (3.5 Paragraph 2, page 21) that fur seals vacate the beach by early January with pups tending to move away from the open beach area and into the tussock grass. However, during the build season the 'open' beach will present many more features including new build materials, demolition waste, and vehicles which may prove an attractant to pups seeking shelter. There may be more seal activity around the camp and build site than has been anticipated. This may impact some of the plans and assumptions detailed in the following sections of the EIA:

- 3.6.3 Construction Materials, p.36, paragraph 1:

The bulk storage area mentioned in this section and also shown in figure 5 on page 32 is not recorded as being fenced to prevent seal ingress. There is a risk

of damage to construction materials and potential injury to fur seals through greater seal numbers in this area than anticipated.

BAS Response:

The bulk storage area will consist of well packaged and protected building materials (some in crates). All waste will be appropriately packaged in drums, FIBCs and on pallets covered with tarpaulins. The risk of damage to equipment has been considered and appropriate packaging provided. It is very difficult to exclude seals from any area as they are adept at climbing. A fence is considered unnecessary as it will likely be damaged/knocked over by seals and could instead cause more injury to the seals. Vehicle operators are also instructed to inspect their vehicles and the cargo storage area prior to switching on the engine and prior to moving equipment in order to prevent harm to any wildlife.

- 7.3 Impact Matrix, p.91, table section 4:

'The deconstructed building elements will be bound together in flat manageable packages and stored in a designated area on the beach near the stone jetty in readiness for removal at the end of the construction season.'

These demolition materials being stored on the lower beach may attract fur seals looking for shelter. If possible this area should be fenced off to prevent seal ingress where sharp edges may cause injuries.

Birds:

7.3 Impact Matrix, p.91, table section 4:

'The deconstructed building elements will be bound together in flat manageable packages and stored in a designated area on the beach near the stone jetty in readiness for removal at the end of the construction season.'

Demolition materials being stored in the open will be susceptible to investigation by sheathbills and skuas. These birds like to peck and tear at insulation and lagging materials which could spread fragments into the environment. Where these types of materials are exposed they should be covered to prevent attack by birds.

BAS Response:

Wastes will be appropriately packaged in FIBCs, drums and UN boxes. Bulky items will be strapped to pallets and if necessary covered in tarpaulins to prevent damage by animals/birds.

Invasive Species:

3.7.1. Transportation for import and export of materials, equipment and personnel, p.39:

'Transport to the Falkland Islands where all cargo will be offloaded to await collection by the BAS ship'.

It is indicated that some items of cargo (large items, prefabricated building sections etc) will not be stored in containers or over-packed. These items pose a higher biosecurity risk if they are to be offloaded and stored in the Falklands. Prefabricated building sections especially provide significant voids and spaces in which insects or rodents could be transported.

BAS Response:

These will be checked and cleaned prior to packing and stored in clean areas. Where possible, i.e. cladding will be wrapped in polythene. All cargo, following storage in the FI and prior to loading onto the vessel for BI will be visually inspected as per checklists and any soil/grass or obvious contaminants removed.

Oil Contamination:

Every effort has clearly been made in the planning process to prevent fuel spills (7.3.1 Transfer, storage and handling of fuel, p.82, section i) but in the event of a sizeable spill on the beach there would be a considerable amount of contaminated beach material - has any planning been put in place for storage, treatment and removal of this material from the island?

BAS Response:

All fuel spills are dealt with on a case by case basis. If it is possible to use absorbent materials on the beach to mop up the spill then this will be done. The fuels used at BAS stations are not crude oils (only MGO used) and therefore it will evaporate in time. If necessary, contaminated beach material can be dug up. All contaminated absorbents and beach material will be stored in available drums and removed at the end of the construction season for specialist disposal in the UK. There is no treatment on site.

Biosecurity Inspections:

Appendix 4, section 2.5 Break Bulk Cargo, p.143:

'During offloading, a nominated BAM staff member will check the item against the manifest and then allow it to be transported to the station. If a biosecurity issue is noted, the cargo shall not be off-loaded until this issue is resolved.'

For large works such as this there is considerable pressure to progress with and complete works to tight deadlines. With cargo from many sources and out of the ordinary supply chains it would be advisable for an independent person such as a GSGSSI employee to be responsible for biosecurity inspections. Having an independent inspector for biosecurity matters would remove this pressure to keep cargo moving and 'get the job done'.

BAS Response:

This is not currently planned. GSGSSI to comment on this

Appendix 4, section 2.8.3 Cladding Panels, p 145:

'When stacked for storage and transport small voids between the steel sheets could become contaminated by invertebrates. Checks shall be made when packing and shipping these materials to ensure that no invertebrates or their eggs are hidden between the sheets'.

It will be almost impossible to make checks between the cladding sheets - will this cargo be packaged or wrapped to prevent insect ingress, especially if it is to be offloaded for temporary storage in the Falklands?

BAS Response:

Cladding will all be packed and stored in a clean environment to eliminate any soil, seeds or invertebrates. Bundles of cladding will be wrapped in heavy duty polythene (0.2mm thick). When stored temporarily in the FI all cargo will be inspected prior to loading onto the ship for final transport to BI. It will not be possible to inspect each item of cladding but the exterior surfaces can all be inspected and any soil/seeds removed.

See EIA section 2.8.3

Appendix 4, checklist 5, p.159:

'Checked prior to loading & offloading...container exterior underneath surfaces (as possible)'

The under surface of containers is an important inspection area as this poses one of the greater risk areas for importing soil and seeds. During lifting and positioning there should be opportunity to hose down the underneath of containers paying particular attention to corner posts which have voids for shackle & cleat attachments and can

easily collect soil. It would be advisable to allocate time into the cargo moves plan for inspection and cleaning to take place.

BAS Response:

Construction partner has confirmed that they can jet wash the bottom of containers before loading onto ship. Biosecurity checklist form has been revised.

Reviewer 3

After review of the EIA and given the nature and scale of the proposed station redevelopment, we do not believe the proposed operations will have a significant impact upon the fauna of Bird Island. However, we have some further questions and comments below, which we suggest are addressed and taken into consideration by GSGSSI. We have split our advice into sections below for ease of reading and have tried, where possible, to relate our comments to the following questions (as requested by GSGSSI):

*1) Are adequate biosecurity measures in place to reduce the risk of introduction and spread of non-native species and disease to South Georgia?
- Are additional measures needed to manage residual risk?*

*2) Have adequate measures been put in place to minimise disturbance to wildlife (including seals, penguins, burrowing birds) and damage to habitats?
- what, if any, additional measures would be appropriate to protect South Georgia wildlife?
- is any monitoring required pre or post operations*

*3) Are there any hazards or impacts which should be included in the EIA which are not currently covered or are not fully accounted for?
- What are these hazards/impacts?
- What mitigation measures would be appropriate?*

1.0 Biosecurity measures

The Biosecurity Plan included in Appendix 4 of the EIA is comprehensive in its coverage, and puts forward stringent measures to prevent the introduction of new species.

Section 2.4 discusses the need for wood packaging to be compliant with ISPM 15. This packaging should also be stamped with the IPPC logo, country of origin and method of treatment. This is mentioned within section 2.8.2, but is a critical aspect of ensuring that the packaging materials are safe, and hence is particularly important within section 2.4. No mention is made of checking compliance with this measure once materials arrive at Bird Island. As a minimum, spot checks of each consignment that includes wood packaging should be made, to ensure that they are appropriately marked.

BAS Response:

All packaging materials are in accordance with ISPM15. As per this standard, the timber is stamped with the isomer logo and country of origin. Certificates from the

Swedish Board of Agriculture are available confirming that the timber complies with ISPM15.

Section 4.4.2 mentions the need to check fruit and vegetables for 'symptoms of disease'. Inspection of food can provide an important control point for invertebrate pests, but is less likely to be effective for disease control without clearer guidance on likely symptoms. Many diseases of fruit and vegetables will be hard to detect, and would require onward laboratory testing to confirm identification. It is, however, unlikely that these diseases would spread to the native flora, given the food storage and disposal methods described in 4.4.3 and 4.4.4.

BAS Response:

The symptoms of disease detailed in the EIA only refers to obvious and visible signs of deterioration i.e. mould, holes, pests which can be identified through the usual visual inspection of fresh food.

The NNS Secretariat¹ are experts on biosecurity measures and we suggest consultation with them, if this is deemed appropriate.

2.0 Ornithological considerations

The main hazards/impacts related to avifauna are likely to be disturbance (noise and human), artificial lighting related impacts (disorientation) and non-native species risks. These have been considered in sufficient detail, except for as highlighted in comments below. Further consideration is required to ensure human disturbance impacts on breeding birds is minimised. It is suggested that a minimum distance of personnel presence from bird breeding locations throughout the proposed construction works is 50 metres, although ideally a thorough literature review/ evidence search would be undertaken to ensure that this is sufficient for all the species breeding in the vicinity of the construction works.

BAS Response:

The nearest known breeding birds to the construction works are (1) wandering albatross, and (2) SG Pipit. The closest wanderer nest in the past 16 years has been more than 110m away. As pipits select nest sites afresh each year it is not possible to say how close, or far away, they could be. However if they do nest close then the territorial nature of the birds dictate that only one pair will be involved. All BAM staff will be briefed on safe wildlife interactions and appropriate distances. BAS staff on station will advise of any specific sensitivities during the construction period.

¹ <http://www.nonnativespecies.org/home/index.cfm>

2.1 Disturbance

The redevelopment will take place within the existing footprint of the current stations. Construction activities at Bird Island will be minimised by using prefabricated buildings.

It is difficult to assess likely disturbance to bird species from construction activities, but the breeding season for some species will overlap with the construction works, including those species which are particularly sensitive to disturbance. Mitigation measures have been proposed within the EIA which will contribute to ensuring disturbance impacts will be minimised, however we have some further detailed comments on these proposals below for GSGSSI's consideration.

The cessation of noisy activities if a threshold noise and vibration level is exceeded is a welcome mitigation measure against possible noise/ vibration disturbance. However, it is not clear from the EIA whether the application of a noise/ vibration threshold will apply to all noisy activities relating to the proposal both on land and at sea (for example relating to extension of the existing jetty). Noise thresholds should be applied to all activities both on land and at sea. We suggest that, rather than only measuring noise levels on the raised walkway (as in Appendix 8, p192), BAS consider if it would be more appropriate to also measure noise levels at a distance equivalent to either the nearest breeding location, the nearest seal location, or the nearest bird location, whichever is closest to the source of the noise (and/ or whichever presents a 'worst case scenario'). This ensures that temporary threshold shifts (TTS) are monitored and avoided.

BAS Response:

The application of a noise threshold only applies to activities on land as this is where noise producing equipment is being used. The jetty extension does not involve any powered tools as the posts are being driven into the seabed using a handheld post rammer and the structure is being assembled with a spanner. It is possible that a small boat with a 10HP outboard motor will be in the water at times as a look out for marine mammals.

The location chosen for measuring noise on land is the raised walkway which is level with the beach at high tide and lies beyond the area covered by any acoustic screens – this is a distance of about 35m from the construction site. This represents the extent to which seals can retreat from the construction site in the direction of the sea, but still remain on land. The closest known breeding bird population is over 100m away from the construction site and therefore measuring at a 35m distance is considered appropriate.

Some additional explanation is included in the EIA Appendix 8.

Some species that will be present on the island during the time of construction are sensitive to human presence in the vicinity of breeding areas. This is treated separately from noise disturbance because noise disturbance relates mostly to machinery and

noise equipment. The EIA states that personnel will be instructed to stick to known trails and briefed on the known locations of nesting or burrowing birds. This is likely to be sufficient mitigation if the known trails that personnel will be instructed to use are sited at a sufficient distance from nests or burrows). Any 'minimum distance' is likely to be arbitrary, but given that studies have shown disturbance effects can be demonstrated from at least 40-50 metres away (de Villiers et al. 2006, Weimerskirch et al. 2002), this is likely to be the minimum distance that is required to minimise disturbance impacts. However, for some species, this minimum distance (40-50 metres) may not be sufficient and a thorough review of existing evidence is recommended to ascertain a suitable minimum distance to avoid or minimise impacts. It is worth noting here that disturbance impacts may be occurring even when it is not obvious to human observers, because responses of wildlife to human disturbance is often physiological and not necessarily behavioural (Coetzee and Chown 2015, de Villiers et al. 2006, Weimerskirch et al. 2002).

2.2 Post-Operations Monitoring

It is stated within the EIA that any bird disorientation or bird strikes will be recorded and reported. As part of this monitoring, information on salient light conditions, type and intensity of artificial lighting involved in the incident, bird species and bird behaviour leading up to the incident should be recorded. This will provide the most useful data for informing future activities and impact assessments.

3.0 Marine Mammal Considerations

3.1 Noise disturbance

The EIA defines a threshold of 85dB(A) be set to reduce noise impacts to seals and that this is 5dB below TTS onset in avian species, however, no references or rationale have been included to explain why this value was used for marine mammals or where it came from. Some elements of the work, such as use of a hydraulic breaker to remove existing foundations or impact driver, may produce noise levels of up to 94dB(A) at 10 metres. We highlight that Southall et al., 2007² proposes a Sound Pressure Level (SPL) of 109 dB re 20µPa (peak) and Sound Exposure Level (SEL) of 100 dB re (20 µPa)²-s for TTS in pinnipeds in air exposed to single pulses. NOAA guidance³ (2016) present weighted TTS onset thresholds for non-impulsive sources at 199 dB (SEL cumulative metric) for otariid pinnipeds underwater.

We note the inclusion of a form of soft start in the plan when using noisy equipment (e.g. hydraulic breaker or impact driver), similar to procedures included in JNCC guidance⁴ for offshore operations. It is not clear within the EIA how personnel will know

² http://sea-inc.net/assets/pdf/mmnoise_aquaticmammals.pdf

³ http://www.nmfs.noaa.gov/pr/acoustics/Acoustic%20Guidance%20Files/opr-55_acoustic_guidance_tech_memo.pdf

⁴ http://jncc.defra.gov.uk/pdf/JNCC_Guidelines_Piling%20protocol_August%202010.pdf

if animals start to approach during breaks in operations; will someone be continually monitoring or will personnel be expected to check before re-commencing work? If so, will they have a clear view? It is also not clear whether there will be a dedicated observer during the soft start process.

BAS Response:

Thank you for the detail in the Southall paper which we have now considered. The threshold of 85dB(A) is based on the 93 db(A) SPL threshold at which TTS occurs in avian species. This is referenced in the following:

- H.Brumm (ed.), Animal Communication and Noise, Animal Signals and Communication 2, Springer-Verlag Berlin Heidelberg, 2013
- Dooling RJ, Dent ML, Lauer AM, Ryals BM (2008) Functional recovery following hair cell regeneration in birds. In: Salvi RJ, Popper AN, Fay RR (eds) Hair cell regeneration, repair and protection, vol 33. Springer Handbook of Auditory Research
- Saunders JC, Dooling RJ (1974) Noise-induced threshold shift in the parakeet (*Melopsittacus undulatus*). Proc Natl Acad Sci USA 71:1962–1965

The avian species threshold has been chosen as it is the lowest and this is applied to both birds and seals as a target threshold to work to.

It's noted that some equipment may produce up to 94db (A) at 10 m which is higher than the threshold set. However, noise is expected to naturally attenuate in air before it reaches the point of measurement (by 3dB by metre). In addition, the acoustic blankets will also be deployed and are expected to provide up to 14dB attenuation. The Monitoring Plan in the EIA reflects these changes.

In response to breaks in operation, the soft start-up operation will be carried out each time there is a break in operation by the person operating the machinery. It is their responsibility to ensure that wildlife have moved away as defined in the monitoring plan:

- 'If the equipment is not used for a period (e.g. 15 minutes) wildlife may start to approach the site again. In this case, repeat the earlier process (i.e. short burst of c. 30 second operation), to provide the wildlife an opportunity to move away again, before commencing more continuous operation.'

The EIA describes the initial set up of operations, and there is reference to what

3.2 Physical disturbance

The monitoring plan (page 175) discusses general and specific displacement and disturbance of female seals. We assume (as reference is made to a displacement log maintained by the contractor), that displacement refers to incidents where seals must be manually moved away from the construction area. The plan limits displacement to two adult female nursing fur seals per day, averaged over a week. BAS should make

it clear how they defined this limit, and whether other seal presence will be noted (i.e juveniles and/ or males).

BAS Response:

Yes, this is correct – displacement refers to incidents where seals must be manually moved away from areas of activity.

The displacement limit (of two female fur seals per day) has been chosen simply as a point by which to measure against and assess whether mitigation measures are effective. It is anticipated that some displacement will be unavoidable so a threshold has been set in order to allow some flexibility on site and allow works to proceed. If more than two seals are being displaced per day then this a prompt to ensure the mitigation measures are being enforced and to review any new mitigation required.

The EIA describes the initial set up of operations, and there is reference to what information will be included in the displacement log. However, we note that there is no information on how procedures will be monitored on a daily basis.

There is no further discussion on how disturbance will be monitored. For example, photos will be taken at the start of works but there is no mention of others being taken at regular intervals during/ after the construction. The purpose of these photos should be made clear.

BAS Response:

The initial displacement of fur seals upon arrival and set up of the construction team will be recorded via photographs taken before and after the setup of the site camp and enclosure fence. Photographs are suggested as an easy means of recording at this early stage when a higher number of seals is expected to be displaced.

On a daily basis, seal displacement will be recorded in the dedicated 'Displacement Log'. Photos are not required on a daily basis as the log is an easier method for daily recording. The Log will be sent to the BAS Environment Office every 4 weeks for review. However, should the displacement threshold be exceeded then BAM will contact the BAS Environment Office within 24hrs to discuss additional mitigation measures.

I have made some edits in the monitoring plan to try and make this clearer.

We query why the movement of seal pups will not be recorded. It is highlighted that fur seal pups have little regard for vehicles and may put themselves at risk, and people operating in the area shall remain vigilant for all wildlife. Is it anticipated that a greater number of pups will require moving than adults?

BAS Response:

Fur seal pups are curious and are unlikely to be deterred by the increased activity on station. It is anticipated that a greater number of pups will require moving than adults. This is an unavoidable activity which is required to ensure the safety of the pups.

3.3 Other comments

The waste management policy says food waste will be discharged to sea beyond the water mark, however it is not clear how close to the construction area this will happen. If this is to take place close to the works, could this encourage seals into the area (directly feeding on the food or as a knock-on effect from their prey feeding on it)?

BAS Response:

Food waste is disposed of at the end of the jetty. Station personnel confirm that the tide takes everything away very quickly and that food waste is not washed back up. Seals feed out at sea and they have not been observed in the area of the jetty during food disposal.

Adult females will suckle their pups in the tussocks between feeding trips; is there a preferred route or path that they follow to return to sea and how close is this to the construction area? Will the exclusion zone force the seals to extend/ divert away from this path? If so, this could result in additional energy expenditure and may deter females from suckling their young. It could also result in greater human contact with seals if they try to follow their usual path, resulting in increased risks to personnel and more seals to be displaced. While we appreciate the importance of the exclusion zone (both for human and seal safety), we recommend consideration is given to the size and location of the construction boundary.

BAS Response:

Seals use the main stream up the centre of the beach when traveling up and down to the tussock. This movement was considered when determining the size and location of the construction boundary and the storage location of materials and wastes. The exclusion zone is limited to the construction area only (south of Prince House and east of Beck House) and will not restrict the movement of seals.

The construction area will be enclosed to prevent seals entering the area. Given the works are to be undertaken outside of the breeding season, it should be made clear how many seals are to be expected in this area during the period of proposed operations. Is it the same number as during the breeding season, the difference being they spend periods at sea feeding and are therefore not on the beach all the time? If

this information is available, it would be beneficial to include it within the EIA to provide more context to the potential disturbance from this activity at this time of year and for it to be fully considered.

BAS Response:

Seal numbers are not routinely recorded at any time on Freshwater Beach. However, after the breeding season a huge number of seals depart the beach, not returning until the next year. All failed breeding females and all adult males return to sea by the end of January. Some sub-adult males move to higher ground in the tussock, and all females and their pups also move to higher ground in the tussock. The beach will become almost empty of seals during the construction period, and seal presence will revert to animals traveling across the beach to get to the surrounding higher ground

4.0 Benthic habitats and fuel storage

We note that the extension of the jetty will not involve any seabed dredging and will be carried out using scaffolding and divers. However, there may still be a risk of direct physical impact to benthic marine organisms. This is not addressed within the EIA. We suggest that if any fragile species/ habitats are known/ seen to be present in the area of operations, impacts are reduced as much as practicably possible.

BAS Response:

Little is known about the intertidal and nearshore marine ecosystem at Bird Island and specifically the area near the jetty as no systematic studies have been carried out. However, it is assumed that the environment does not differ from that of the rest of South Georgia. The jetty will be extended with the support of a motor boat in the water and the use of hand held tools only. The scaffold elements will be driven into the seabed using a hand held post rammer. No power tools will be used, no dredging or blasting will be carried out and no intentional damage to the seafloor is planned. We recognise that there will be some physical damage to the seafloor in a few areas where the scaffold is driven into the seabed. However, this impact in a few localised and very small areas of the seabed is considered minimal and unavoidable.

See EIA: 7.1.5 and 7.3

We note that MGO fuel is stored and used on site and we believe that the proposed refuelling procedures and contingency plans are adequate to mitigate against the risk of an unplanned pollution event.

Reviewer 4

Overview

This report is a review of the biosecurity components of the environmental impact assessment submitted to GSGSSI by the British Antarctic Survey (BAS) in regard to the redevelopment works that are planned at Bird Island, in response to the question:

- *Are adequate biosecurity measures in place to reduce the risk of introduction and spread of non-native species and disease to South Georgia?*
 - Are any additional measures needed to manage residual risk

Summary of response:

- Biosecurity measures are in place but some gaps have been identified and suggestions are made to ensure that the proposed measures are adequate.

Areas of biosecurity concern:

The proposed work includes four areas of biosecurity concern:

1. Importation of construction materials and equipment for the jetty
2. Importation of materials and equipment for the temporary construction workers camp
3. Importation of the construction workers personal kit
4. Importation of food and other goods for 10 construction workers over an expected period of four months

The presence of the new jetty itself is of biosecurity concern as it will allow the new BAS supply to come alongside, facilitating relatively easy transfer of non-native species to Bird Island. There is therefore a need to review of post-construction phase monitoring of the area to ensure the additional risks are adequately mitigated; this aspect is not covered here, and just flagged for attention.

Detailed response

Importation of materials and equipment for the jetty and temporary construction workers camp

- The nature of the materials being imported (i.e. precast concrete foundations, concrete rings, prefabricated timber, treated timber sleepers and treated chestnut picket fencing (Section 3.6.3 p36 Tables 3 and 4)) is considered relatively low risk due to their nature. Adequate measures are in place for cleaning and inspection of materials on arrival at consolidation points in Europe and the Falkland Islands (Section 3.7.1 p39; Section 7.1.1 p80; Appendix 4 p138).
- Importation of high risk aggregate is not anticipated and an adequate protocol is in place if the need arises (Appendix 4, 2.8.1, p 144).
- The proposed timescale for importation of materials and construction is narrow, with some materials landed November and the main work phase February to May (Section 3.5 p21, Table 1 p22, Section 3.6.2.1 p30). The narrow window is considered to reduce biosecurity risk by minimising the time period when propagules could arrive and establish.
- Imported vehicles are considered relatively high risk (Section 3.6.1.2 p30; Section 3.6.4 Table 4 p37). Measures are in place for cleaning and inspection

(Appendix 4, 3.2.2 p148) and these activities need to be flagged as high priority. Based on experience of interceptions from imported vehicles in St Helena, an inspection protocol for vehicles was developed and can be found at <http://www.sainthelena.gov.sh/wp-content/uploads/2013/09/Manual-of-inspection-procedures-Oct16-2.pdf>, page 19. It is suggested that this is used as a model for vehicle and mechanical plant inspections.

BAS Response:

We have cross-referenced with the Saint Helena inspection procedures and updated our own vehicle inspection checklist – see Appendix 4, Biosecurity Checklist 4.

Spiders

The Biosecurity Plan rightly identifies rodents as the priority high risk species for specific attention. A second high risk priority group is considered to be Arachnids, specifically spiders. As predators, non-native spiders could potentially have high negative impact on native invertebrates and originating from the north temperate region or Falkland Islands where the materials are being sourced, will be likely to find conditions favourable on Bird Island for establishment.

Interception data from the Falkland Islands and St Helena illustrate the risk of introduction of spiders as transport stowaways:

- Falkland Islands: in 68 interceptions between 2007 and 2017, 27 were arachnids (40%) of which 10 (37%) were intercepted from fresh produce and seven (26%) from vehicles.
- St Helena: in a total of 245 vehicles inspected between January 2016 and March 2017, 99 (40.4%) were contaminated with soil, and 16 (6.5%) infested with a total of 75 live spiders of at least seven species.

It is therefore **recommended** that biosecurity measures are also focused on minimising the risk of introduction of spiders, and suggestions for this are included in comments on the Biosecurity Plan, below.

Importation of the construction workers personal kit and food and other goods for 10 construction workers over an expected period of four months

The proposed biosecurity measures to mitigate the risk associated with workers kit and imported foods are outlined in Section 14.4 Appendix 4 – BAM Biosecurity Plan, and comments on this are given in Table 1 below.

BAS Response:

All suggested changes shown in table 1 below have been made within the revised EIA except where specifically identified. Please refer to the individual comments below for explanations.

Table 1. Suggestions for additional actions in the BAM Biosecurity Plan.

Section and page	Text	Suggested additions or changes
1.1 Prohibited items, p139	Fifth bullet point, Any perishable foods...	What about herbs and spices? For workers going to a remote difficult place, this is the sort of thing people are likely to take to liven up an anticipated dull or repetitive diet. This needs to be made clear – can workers take packets of their favourite spices. Suggest that ground spices are acceptable in new unopened packets / jars from a commercial source, but herbs, unground spices, or opened packets / jars are not.
2.1 Pre-departure Biosecurity – Personal Biosecurity, p141	First bullet point – workers should wash outer clothing at hottest temperature to remove seeds etc.	Add visually check for seeds, especially turn ups, folds, pockets and Velcro fastenings.
	Second and fourth bullet points	Soles of footwear to be checked, cleaning to include mud/soil in treads on soles.
	Seventh bullet point	Add not to leave packed effects standing around, or pack long in advance of departure, to minimise risk of spiders taking refuge.
2.3 Cargo Packing Areas, p142	Third bullet point	Also checked for wasps nests, spider webbing and spider cocoons, etc.
	Fifth bullet point – store doors to be kept closed	Change “whenever possible” to “except when in use”
2.4 Packaging, p142	Second list “The following packaging types” third bullet point	New, not used materials
	Second list “The following packaging types fifth bullet point, use of corrugated cardboard boxes should be minimised	Before use, place corrugated cardboard into a strong bin liner and spray domestic insect spray (eg Doom, Raid) for at least 5 seconds, then tie top and leave for at least 12 hours to kills any invertebrates harbouring in the corrugations.

Commented [MAM2]: BAS Response: Cardboard packaging will be kept to a minimum and packed within containers for transport. All containers will be fumigated prior to sealing. It is not considered reasonably practical to spray each individual box in a sealed bag 12 hours before packing and therefore this is not an activity we can commit to.

2.5 Break Bulk Cargo, p143	"Therefore, all items of break bulk cargo, including packaging, shall be visually inspected for signs of rodent gnawing or rodent ingress"	Add "and signs of invertebrates such as spider webbing, cocoons or frasse"
2.6 Small Plant and Tools, p143	Third bullet point, inspected for plant fragments, seeds and insects	Add soil, spiders
	Fifth bullet point, cleaning	Is the policy to avoid the use of any pesticides at Bird Island for preventative actions? If this is not a specific policy, then a preventative spray with a domestic residual aerosol (eg Doom, Raid formulated as residual, not knock-down) can be made of crannies and crevices of small plant and tools to kill any harbouring spiders and other invertebrates.
2.7 Vehicles and Large Mechanical Plant, p143	Second bullet point, brushing upholstery mats	Clean under mats, seat covers etc
	Fourth bullet point, inspected for plant fragments, seeds and insects	Add soil, spiders
	Sixth bullet point	Is the policy to avoid the use of any pesticides at Bird Island for preventative actions? If this is not a specific policy, then a preventative spray with a domestic residual aerosol (eg Doom, Raid formulated as residual, not knock-down) can be made of crannies and crevices of vehicles to kill any harbouring spiders and other invertebrates.
		Based on experience of interceptions from imported vehicles in St Helena, an inspection protocol for vehicles was developed and can be found at http://www.sainthelena.gov.sh/wp-content/uploads/2013/09/Manual-

Commented [MAM3]: BAS Response: Some small plant has already been packed so it will not be possible to use a domestic aerosol on them now. However, where practically feasible we will endeavour to use an insecticide spray on small plant and tools prior to packing. This is now included in Checklist 3.

Commented [MAM4]: BAS Response: Where practically feasible we will endeavour to use an insecticide spray on vehicles prior to the loading onto the vessels. This is now included in Checklist 4.

		<p>of-inspection-procedures-Oct16-2.pdf, page 19.</p> <p>It is suggested that this is used as a model for vehicle and mechanical plant inspections.</p>
2.8.2 Timber, p145	Bullet list	Add bullet: no timber with bark allowed
3.2.1 Cargo Inspection Pre-offload; Cargo Boxes and Break Bulk, p148	Visually checked for signs of rodent gnawing or rodent ingress	Add spider webbing, frasse
4. Biosecurity on Arrival at Bird Island; 4.1. Personnel Disembarkation, p149	Third bullet point: boots to be inspected and cleaned	Pay particular attention to soles, and any mud/soil in the treads, and seeds on tongue, lining or Velcro fastenings.
4.4 Fresh food, p149		<p>There are no requirements for inspection and documentation of fresh food pre-loading in the Falkland Islands. This may not be an issue or may place an unacceptably high work load on Falkland Islands biosecurity staff.</p> <p>If it were logistically feasible this is the ideal point to check for prohibited or contaminated produce, before it is placed on the supply vessel.</p>
		What about dried foods? Any checks or inspection for webbing, frasse, etc?
4.4.2.1 Fresh produce inspection, inspection protocol on arrival at Bird Island, p150	Second bullet point: "Fresh produce should be checked aboard the ship..."	<p>It is not clear exactly what this check consists of or how comprehensive it should be. Are inspectors expected to open boxes/packages, and if so how many of them? This needs to be clear to help the inspectors do their job adequately.</p> <p>Suggest: External visual inspection of all boxes, any signs of rodent activity, webbing, contamination, or bad packaging, excessive signs of rot, presence of prohibited produce. Any signs of the above and the box/package isn't landed.</p> <p>A protocol needs to be in place in the event of produce failing the check, to contain / destroy</p>

Commented [MAM5]: BAS Response:
It has been decided that food for the project will be provided by BAS. There will be a shared cook who will prepare meals for both BI staff and BAM construction team. Therefore BAS is managing the import of all food as per usual procedures and as per BAS Biosecurity Handbook.

All food sourced by BAS is requested from suppliers pre-washed and soil free. All fresh produce is inspected by the ship for invertebrates, damage and mould. If the infestation or damage is considered excessive then the ship will not offload the food.

Commented [MAM6]: BAS Response:
Dried foods are not considered higher risk than any other cargo but they will be packed in a clean warehouse and inspected prior to sealing in a container and inspected again prior to offload at the station.

Commented [MAM7]: BAS Response:
This has not been detailed in the EIA as it is covered in the BAS Biosecurity Handbook and is part of the normal BAS operation. All fresh food containers will be inspected on the ship prior to offload ashore and the inspection process followed is as suggested here. Each crate will not necessarily be turned out but an assessment of the condition of the fresh food will be made based on what is visible (soil, invertebrates, mould etc.)
Protocol for containing food on the vessel, if infested, already exists and is implemented via the BAS Biosecurity Handbook.

		infestations detected on the supply vessel.
	Fourth bullet, inspection area clean and well lit.	<p>Add: inspected against a white surface.</p> <p>One useful and simple piece of equipment could be several 1x1m or 1.5 x 1.5m sheets of white formica to serve as inspection benches – easy to wipe clean, store and travel flat, cheap, lay them over a table to make the bench when needed.</p>
	Fifth bullet point, UV light zappers	<p>No guidance given on location or use of these, apart from switch on when inspecting.</p> <p>UV light zappers must have new tubes at beginning of work (replace after 6 months, if work continues), for the number required per area check manufacturers recommendation depending on the model used, place in darkest corner, switch on when start work and leave on overnight after inspection to capture any invertebrates which may have escaped notice.</p> <p>Check trays next day and collect and identify any invertebrates found.</p> <p>A protocol needs to be in place in the event of detecting a new non-native species.</p>
4.4.2.4 Disposal of contaminated or infested produce, p151	Second bullet point: isolate produce etc	<p>Needs to be securely contained as well as isolated, seal containers.</p> <p>Potentially, there could be double bagged infested produce on Bird Island for a period of days (weeks?), and if this is a large amount it won't have been frozen, increasing the potential risk as it will be a large amount).</p> <p>Suggest: spray with domestic aerosol (eg Doom or Raid) inside the double bags for at least 5 seconds (longer if there are large or dense amounts) then tie seal the bags.</p>

Commented [MAM8]: BAS Response:
The inspection is carried out in the kitchen on a stainless steel counter which is considered an effective surface to work on.

Commented [MAM9]: BAS Response:
UV light zappers are located in the kitchen and food store areas in Prince House.
The current process is to keep the light zappers on continuously rather than turning them on and off.
Trays are not checked on a regular basis currently as it is seen as a precautionary measure rather than an opportunity for monitoring but we will introduce process of checking after each cargo offload and on a two-week basis.
We do not currently identify any invertebrates found but simply destroy them in ethanol.

Commented [MAM10]: BAS Response:
It is unlikely that a large quantity of infested fresh produce will be offloaded at BI due to the checks that are in place on the ship and on station (whilst the ship is still at anchor and infested food can be returned).
However, if infested food is found that cannot be stored for a long period of time then it is autoclaved on station. We will introduce the process of spraying contaminated food with a domestic spray as suggested.

4.5 General awareness, p152		Add a fifth bullet point: Spiders
5.Non-conformance, p153	Fourth bullet point, examples of biosecurity breaches, second sub bullet "live insects within cargo"	Add "and spiders"
Biosecurity checklist 4. Vehicles and Large Mechanical plant, p157	Under check prior to loading onto vessel	Add wing mirrors, windscreen area (these are high risk areas for spiders). See note above under 2.7 on vehicles inspection protocols.
Biosecurity checklist 6: Fresh Produce, p161	Before arrival at Bird Island. Third line "root vegetables have been pre-washed and do not contain surface soil"	Suggest a tolerance level is defined as it is very hard to pre-wash all soil out of the eyes of vegetables; 2% is the standard but suggest 1% in this case.
Fresh food storage areas at Bird Island, p161	Fourth and fifth lines – UV fly zappers and sticky traps	How often will they be checked for signs of insects? Suggest after each offloading, and at least weekly. A protocol needs to be in place in the event of detecting a new non-native species.

Commented [MAM11]: BAS Response: 1 or 2% as a tolerance level does not seem very practical. If vegetables are substantially contaminated with soil then they will be returned to the ship. However, if there is only a little surface soil then this will be brushed off, collected and autoclaved. Any vegetable peelings (with remaining soil) are also pressure cooked prior to disposal.

Commented [MAM12]: BAS Response: As comment above. We will introduce the inspection of UV fly zappers after each cargo offload and on a two week basis. Currently, sticky traps are inspected each month and replaced as necessary. BI staff will be instructed to inform BAS Environment Office of any findings. However, due to the availability of relevant taxonomic expertise, identification of new species is challenging. We would, of course, be open to suggestions from GSGSSI

Reviewer 5

General comments

This is a well-written comprehensive EIA which provides much of the necessary background for assessment of risk associated with the construction. Lots of information is covered demonstrating a thorough consideration of all elements of the project and the potential risks they may pose.

The report would benefit from references for some specific claims/statements (even if just pers com). Addition of references in the body of the text, especially for some of the sites specific Bird Island statements surrounding distribution of wildlife and appropriate mitigation measures etc, would help make these statements more compelling and provide re-assurance that the mitigation measures were appropriate.

BAS Response:

Where possible, references have now been included.

In terms of the approach and consultation on the EIA the document makes reference to the Environmental Charter. Although Charter provides useful context, the SGSSI

strategy and NBAP provide the current framework for development. In terms of GSGSSI's commitments surrounding EIA's it would be more appropriate to refer to NBAP 4.1.3 "*work with appropriate independent experts to review any development which has a major impact on the exciting footprint of operations and/or that have a potential to have a major impact on the environment and ensure best practice are upheld*". GSGSSI will place this EIA and the reviewers comments on its website to ensure stake-holders are aware of the process (and can comment if they wish) but have not solicited a formal stake-holder consultation on this programme of works.

BAS Response:

Suggested changes have been made. See 2.1 and 2.3

The summary table showing activities, effect/impact and mitigation measures is a useful over view of the project. However it would be beneficial to include a clearer description of how the probability/severity impacts are defined and also an indication of how the proposed mitigation measures would reduce the probability/impact. This would aid readers to understand residual risk. A colour coding may be of benefit here too. Although it would potentially make the table quite big, an indication of knowledge gaps and how this has impacted assessments would also be worthwhile. For impacts/mitigation measures where there is a big knowledge gap or uncertainty, the residual risk may be considered higher.

BAS Response:

Many of the comments here have been taken on and a clearer description of the likelihood and significance has been provided – see section 7 in the EIA.

However, knowledge gaps although considered in the overall qualitative assessment have not been expressly identified in the impact matrix. If GSGSSI consider this necessary and worthwhile, then we can review the impact matrix again.

The biosecurity checklists are really helpful and think these are a great idea. It would be useful to identify in the forms who was completing the inspection (name and signature).

BAS Response:

Yes, this has been done as suggested

Will infringements on the checks at all stages be fed into the BAS AINME system or do BAM run a separate system for pre-departure checks etc? Section 5 talks about non-conformances but it would be useful to have a bit of detail about what the process would be if infringements were detected in terms of deciding on if any remedial measures as needed i.e. re-briefing, heightened monitoring, incursion response etc. This could be a fairly simple scheme as it would probably depend on the nature of the

infringement but an indication of the possible courses of action and who would be involved in the decision making process would be a useful addition.

BAS Response:

All infringements on biosecurity checks and other issues will be reported through the BAS AINME as detailed in the non-conformances section in the Biosecurity Plan. Some guidance has now been included in the EIA to indicate the decision making (and those involved) process in response to any incidents.

There is lots of potential for valuable lessons to be learned as a result of this programme of works in terms of the efficacy of environmental mitigation measures. The monitoring works look very useful (especially things like wildlife displacement, noise from construction) and could provide valuable information for similar projects in high wildlife density areas. At the end of the project, it would be extremely helpful if this monitoring information and 'lessons learned' from other sectors AINME etc were consolidated into a report that could be submitted to GSGSSI and made available for others to use as appropriate.

BAS Response:

Yes, this can be done.

Specific comments

P 14 – It would be more appropriate to refer to the NBAP rather than the Environmental Charter in this circumstance.

BAS Response: updated as per suggestion

Permit issued will be a RAP rather than a WPA

BAS Response: updated as per suggestion

P 15 - Useful to list what non-statutory organisations were consulted.

BAS Response:

Only BAS, BAM, Swecco and Ramboll were consulted so I have removed sentence on non-statutory organisations

P 15 – Biosecurity now remit of CEO (will be Director of Environment and Fisheries when appointed). 'BAS Environment Office maintain direct consultation with the relevant Officers within GSGSSI'

BAS Response: updated as per suggestion

P 30 – Is it possible to provide a maximum estimated volume of 'local beach' material that will be used and how areas will be selected to take it from in order to minimise impact

BAS Response:

It is not possible to say how much beach material will be used until the construction team is on site and can make an assessment. However, the beach material used will not exceed 6m³. This will be selected from a large area of the beach and evened out so as not to leave any obvious dips or holes in the beach.

See EIA update – 3.6.2.1

P 30 – Are BAS confident that the additional grey water from the construction camp be dealt with through the stations existing facilities? Is there any contingency?

BAS Response:

Yes, this has been reviewed by our Estates team and facilities manager and there are no concerns about the existing facilities. There is no treatment of sewage or grey water at BI.

P 30 – It would be advisable for the bunk-a-bin sleeping units to have crawling insect (and maybe rodent) traps inside. Where will they be sources? Are they new or second hand? Useful to develop a specific biosecurity checklist for these items

BAS Response:

The bunker bins are second hand and have been used at other locations. Prior to shipment, these will be thoroughly cleaned and inspected as per the Biosecurity Plan at all stages of the shipping process. The inspection/cleaning will include the use of an insecticide fumigant prior to final shipment on the Ernest Shackleton. Checklist 5 (for ISO containers) has been edited to include the inspection of bunk-a-bins in the EIA.

With the necessary mitigation measures in place we consider that the bunk-a-bins do not require insect and or rodent traps inside them. However, these can be supplied if GSGSSI consider them high risk.

P 33 – Are there any reverse biosecurity considerations shipping material from SG to either FK or UK?

BAS Response:

Yes, and this is something we have discussed and agreed with BAM. I have made an addition to the biosecurity plan in the EIA – appendix 4.

P 34 – Are other habitats e.g moss banks, other types of grass etc likely to be disturbed?

BAS Response:

No, only the three areas of sparse tussock (as identified in the EIA) may be disturbed during the set of the construction camp or during the demolition/construction of Beck House.

P 39 – Where will cargo be stored in the Falklands? On hard standing? In doors or out? How will it be secured so it is not infected with wind blown seeds, or insects?

BAS Response:

The storage facility in the Falkland Islands is likely to be outside. However, it will be on hard standing. The majority of the cargo will be containerised and break bulk will be kept to a minimum and overpacked where possible. All materials (and containers) will be inspected and cleaned prior to loading onto the ES.

P56 – The Falkland Island Dependencies Conservation ordinance 1975 was repealed as part of the Wildlife and Protected Areas Ordinance 2011.

BAS Response: updated as per suggestion

P57 – It is worth noting that unlike mainland South Georgia, on BI there is only one recorded instance of a non-native plant species, *Poa annua* which although there are no known extant individuals, there may still be a seedbank for. (see this is also covered in 5.2.7)

BAS Response: updated as per suggestion

P 60 – On mainland SG pintails would probably nest anywhere there was good tussock cover – not sure that they would prefer higher ground necessarily. Is there a reference or a pers com for this in a BI context?

BAS Response:

Pintail ducks nest in good tussock near freshwater ponds. There are no ponds near Bird Island station so they are unlikely to be found there. I've updated the EIA

P61 – What would the contingency plans be if a pipit (or pintail) nest were found in the area behind Prince House?

BAS Response:

The area behind Prince House will only be used for installation of the bunker-a-bins (for accommodation) and for the new bulk fuel tank. None of these will be installed on tussock grass. If a pipit or other nesting bird is found in the tussock behind Prince House then all efforts will be made to avoid disturbance during the installation of accommodation and the tank. Tussock removal will only happen if necessary (for vehicle access) and if it has been confirmed that there are no birds present.

P62 - I think SMSG did some surveys of Bird Island which may provide some additional info on benthic communities. Contact Paul Brewin - pbrewin@smsg-falklands.org

BAS Response:

See response to Reviewer 3 (point 4). I contacted Paul Brewin and he was able to provide some surveys from areas in South Georgia but nothing specifically for Bird Island.

P 79 – Useful to know a bit more about what format the briefing will take (written, oral etc). We have found it useful in the past to get all members of a construction team to sign to certify that they have understood the EIA and will comply by the mitigation measures outlined within it and would recommend BAS/BAM do the same here

BAS Response:

See previous response as this is a repeat of a question from Reviewer 1

P 79 – A definition for each of the probability rankings should be provided. In the significance criteria it would also be helpful to more clearly define 'minor', 'temporary' and 'significant'

BAS Response:

As previous comments, this has been reviewed.

P80 –Are any contingency plans in place in the event an invertebrate is sighted? Given the large amounts of cargo and timber being brought ashore for this project, this would be advisable.

BAS Response:

The general response in the event an invertebrate is sighted (during cargo offload, when opening boxes/containers and inspecting fresh food) is to exterminate it immediately. It is advised that personnel have insecticide spray to hand when carrying out any of these activities. However, there is no formal contingency plan in place as it is difficult to distinguish between invasive and native invertebrate species and therefore the emphasis is on vigilance for invertebrates when inspecting imported goods.

The most recent BAS BI rodent contingency plan should be included as an annex to the EIA. Does this involve holding a supply of bait at BI? Given the heightened risk during the construction period, the plans and equipment contingency for BI should be equivalent or greater that at KEP and station personnel run an exercise so they are prepared in event of incursion.

BAS Response:

The BAS BI rodent contingency plan has been included as an appendix. There is a station supply of bait at BI and BAM are importing additional bait for the construction period – see section 4 in the Biosecurity Plan (appendix 4).

We take on your advice about running a response exercise and would welcome any information you can provide from the KEP rodent response exercises. Anna Malaos will be visiting KEP in mid-November and if time allows will endeavour to spend time with the Government Officers reviewing the process.

We suggest that January is the most appropriate time to carry out the exercise so that station personnel are prepared prior to construction cargo being offloaded.

Is the position of the storage depots above the highest level likely to be reached by a storm surge (local knowledge of past station personnel)? If this coincides with a high tide water can come an considerable way inland.

BAS Response:

Storage depot locations were chosen based on the experience of the 2004/05 Prince House redevelopment project. The same storage location was used previously as the area is at a distance from bird breeding sites, it is dry and is above the known high tide water mark.

P 81 – How far from the site will it be necessary to go to capture the additional water needed for the BAM team? Are there likely to be any impacts from this?

BAS Response:

The decision has now been made to introduce a reverse osmosis (RO) plant at Bird Island rather than the previously listed freshwater filtration. The RO plant has been purchased and will be re-used for some of the other construction projects at other BAS stations. The plant will desalinate seawater instead of using freshwater streams. See 3.6.2.1 in the EIA.

P 81 – The process for deciding what items are of cultural or historical importance needs to be more clearly described. What will the decision making frame work be? Who will be involved? How will information be communicated? NOTE: that under GSGSSI's heritage policy (<http://www.gov.gs/heritage-2/heritage/>) items pre 1983 are considered 'historic'

BAS Response:

Beck House is a modern building constructed in 1995/96 and therefore the structure itself is not considered to have any heritage value worth preserving. However, a process for identifying and making decisions on items of cultural/historical importance at all BAS stations has been established and this will be applied to the contents of Beck House prior to demolition.

The heritage selection methodology is in 3 stages:

Stage 1: The initial identification and recording of the object.

Stage 2: A statement of the significance of the object, arrived at by considering factors contributing to heritage value, the potential for different stakeholder groups to attach different heritage values to the same object, and the relationship of the object under consideration to comparable objects.

Stage 3: A series of pragmatic decisions, based upon the information in Stages 1 and 2.

The intention is to involve the Station Leader at Bird Island and all station staff in this process and will initially involve asking them to walk through the station and identify and note any features or objects that they consider to have a heritage value.

This will be recorded in a spreadsheet with photographs and sent to the BAS Archives Manager for review which will then if necessary proceed to stages 2 and 3. For the purposes of this process heritage is defined as: all inherited resources which people value for reasons beyond mere utility. This definition includes the widest range of physical 'things'. It also encompasses the range of emotional and intellectual values attached to them.

The final decision on what to do with any items identified as significant will be undertaken by the BAS Archives Service / Environment Office / UK Antarctic Heritage Trust, in liaison with other parties as appropriate. The final decision must receive approval by the BAS Management Team in order to proceed.

The heritage selection process and all its stages is detailed in specific documentation which will be communicated to the BI team. This level of detail has not been included in the EIA.

P 82 – How is the old Beck House insulated? Is this encapsulated within the walls or is there a risk of it blowing away during demolition? Is it possible to demolish the house from 'inside out' rather than 'outside in' limiting the chances for material to blow away

BAS Response:

The insulation is encapsulated within panels and therefore there is little risk of insulation blowing away. Any inside demolition of internal walls that can be completed prior to the outside being removed will be.

P 83 – Has consideration been given to what the most appropriate colour would be for external lighting and if this could further reduce risk? Some research suggests that green light may be less likely to result in bird strike.

BAS Response:

No, this has not been considered. Research we were aware of indicates that high pressure sodium lights (or other lights with similar spectra) decrease fatal impacts.

P 84 – Will additional oil spill response equipment be brought to site during the construction period? This could be listed as an additional mitigating factor

BAS Response:

Yes, as indicated in section 3.7.4.1 in the EIA. I have also highlighted this as a mitigation factor.

Detail needed about recreational travel for construction staff – if this will be permitted and if so where. Wildlife approach distances MUST be adhered to and given densities

of wildlife on BI this may mean no trips to bird breeding sites unless part of authorised science trip.

BAS Response:

The BAM BI construction staff will be briefed on the BAS local travel area once they arrive on site. Initial travel in the local travel area will be guided familiarisation walks with BAS station personnel and will include training on the station communication protocols.

The BAM BI construction staff will receive training on wildlife distances with a particular emphasis on fur seal avoidance training. Access to bird breeding sites will only be permitted if staff are accompanied by a BAS zoological field research assistant and if it is permitted under the GSGSSI Regulated Activity Permit.

Construction personnel should to be briefed on implications of images posted on social media being taken out of context i.e. even if helping on an authorised science trip, this may not be clear from the image and so the public perception could be unfavourable

BAS Response:

This was covered by a specific session by our Media team during the General BAS pre-deployment induction.

P89 - It would be useful to include a probability/severity impact for both before and after mitigation measures have been implemented so residual risk can be assessed.

BAS Response:

The probability/severity impact has been provided for before mitigation measures are applied but not after. This is now more clearly explained in the EIA. The process for estimating probability and severity is based on professional judgement and knowledge and is simply a qualitative measure. However, the proposed mitigating measures for each activity are expected to reduce the likelihood of the impact occurring and therefore minimise the risk.

P141 – How will the BAM personnel be briefed about pre-departure biosecurity? Useful to say if this will be at an induction day (like conference) or if the info will be printed/posted.

BAS Response:

As per training provided by BAS (as indicated in response to Reviewer 1). Pre-departure biosecurity is highlighted at the general pre-departure conference by Environment Office presentation and was also highlighted in the specific BI

environmental induction again delivered by the Environment Office. All BAS staff and BAM BI construction staff are issued with a personal biosecurity checklist.

P 142 – It is not clear how an 'invertebrate infestation' would be defined. Understand the difficulty in this but conscious that ambiguity may be difficult for store staff to work with. Are there any 'high risk' species worth mentioning that if they are found, remedial measures should be taken?

BAS Response:

It is difficult to define but if dealing with fresh food and more than two invertebrates are spotted upon first opening the sealed container then it is likely that there is a greater infestation and the advice is to seal the box and return to the ship where it can be inspected again.

Yes, there are some species which are known to be more invasive than others but it is not necessarily helpful to identify them as the response remains is the same. If an invertebrate is found then it should either be immediately killed or if possible the infested container returned to the ship.

P 145 – It has been found that checking timber bundles is can be difficult as after pre-boarder checks at packing facilities, spiders, earwigs, beetles etc can often find their way in. In lieu of a sufficiently large biosecurity facility on-shore, bundles of timber must be inspected thoroughly on board the supply ship immediately before taking them ashore. Provision should be in place to decontaminate wood if it is found to harbour invertebrates

BAS Response:

The final method of packing has not yet been agreed for timber. If it is possible to be containerised then timber will be inspected prior to bundling and placing in container. The container will then be fumigated before it is sealed. Timber will only be removed from the container prior to offloading. If the timber is shipped as break-bulk then where possible it will be wrapped in polythene film to prevent invertebrate ingress. It is not considered practical to inspect each individual timber item on the ship – a visual inspection will be carried of the external, visible surfaces but it will not be possible to break the bundles apart and thoroughly inspect each timber item on the ship. Once cargo is offloaded ashore and the bundles broken up then personnel will be inspecting the timber and will have insecticide to hand to deal with any possible invertebrates.

P147 – For inspections of the rodent bait stations these should also be inspected on entry into the SG MZ and a general check of the vessel to make sure there are no signs of rodents. This should be reported to the GSGSSI Government Officers by e-mail.

BAS Response:

This is not something that BAS ships currently routinely do though bait stations are inspected. We have now formally requested that BAS ships inspect all bait stations within 48hours of leaving port (destined to SG MZ) and prior to arriving at any location in SG. If anything is found then this should be reported to BAS via the AINME system which will then trigger a report to GSGSSI.

P148 – As mentioned above, it would be worth noting that on break bulk items the pre-offload inspection should also focus on checking timber produces for signs of invertebrates. Potentially worth developing a checklist for this.

BAS Response:

A new checklist has been made for break bulk – see checklist 7

P 150 – Given the increased number of people on station and the extra fresh produce etc, are the existing 'biosecurity facility's/kitchen area' big enough? Is there another area which could be temporarily designate this or will there be sufficient space?

BAS Response:

The construction period will see a doubling of staff on station with up to 19 people on station. The Prince House kitchen and food storage areas will be used for all fresh produce storage and will be managed by a designated cook. It will certainly be a larger quantity of food to inspect but the area will be sufficient for a short period of time.