ADAPTATION TO CLIMATE CHANGE PROGRESS REPORT

NORTHERN LIGHTHOUSE BOARD

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Introduction

The NLB provided their initial report on Adaptation to Climate Change (ACC) in the early part 2011 and it was formally accepted by The Department for Environment Food and Rural Affairs (defra) by letter in May 2011. This report is prepared in response to a request from defra to report on the progress made from the original report and discuss any learning outcomes and further actions which have been planned in the intervening period.

Review

The original ACC report included a summary table of climate change risk assessment and associated action plan which described the possible impact of climate change effects on the provision of our service and the planned mitigating actions. This plan along with the original report has been reviewed in various ways and in various forums. The original report has not been amended but the table of risk assessment and action plan has been periodically updated and the latest version is attached with the changes from the original highlighted. As can be seen some actions are complete but others are long term and show no change from the original, still others have changed their focus slightly as the actions have been reviewed. Most of these involve the collection of real data on some of the climate variables and how, where and when they are affecting our activities, this will inform our decisions on any mitigating actions we should take but this again will be a long term plan as trends will take some time to emerge from the data.

Understanding Climate Risk

Our understanding of climate risk as it affects NLB's operations has been enhanced by reference to relevant chapters of the IPCC's 5th Assessment Report (AR 5) which has been published since the NLB's original ACCR was issued. The information contained in AR 5 has served to reinforce our original perceptions of the effects climate change rather than engender any changes in direction. The Environment Agency has run a series of webinars on climate change and adaptation reporting which has also served to increase our understanding.

Data is being collected by marine and engineering personnel when visiting lighthouse sites to record, on a simple form, any weather and/or sea conditions which disrupt or prevent scheduled NLB activities. The recording of these instances does not involve any significant increase use of resources. This data is recorded on a monthly basis and sent by the staff affected to a central point for collating and filing. In the long term it is hoped that analysis of this data will yield a deeper insight into how the impact of certain climate change variables are affecting our operations and whether our current assumptions are correct or not as well as identifying any patterns in the data, this has been incorporated into the Action Plan.

The data collected so far has served to endorse the belief that the two elements which affect our activities most are extremes of wind and sea conditions, mostly in the North and West of Scotland and usually during the winter months. In the vast majority of cases so far, these conditions have resulted in a prevention of access to sites by either helicopter or boat. This has not had an effect on our service provision, the availability statistics of our lights are still within the recognised international standards, but it does mean delays and additional costs in carrying out preventive maintenance or repairs for instance. The data collected may, in the future, give a better picture of the likelihood of extreme weather in certain areas at various times of the year and lead to more informed planning of activities in order to mitigate such risks (e.g. limits at which operations can be sustained and best mode of access) and so avoid unnecessary costs and use of resources. There were also two cases of extreme sea surges in 2014 which damaged buildings and walls adjacent to lighthouses. These events did not cause any interruption to the provision of our service but did entail repair costs which were not budgeted for. Instances of these types of events continue to be monitored, so far in 2015 there have no further reported occurrences.

Understanding Climate Risk (cont'd)

An effort to improve the efficiency of our lighthouses and also an apparent decrease in the amount of sunshine available to the solar panels at our solarised lights has led to an initiative to increase battery capacity as well as the number of solar panels at those lighthouses and to factor these considerations into future designs. The installation of developing technology in light sources (e.g. LED lights) will also help our resilience in this area in that there will be a reduction in the power requirements to provide the same intensity of beam. The introduction of these initiatives reduces our use of and reliance on mains power and back up diesel generators which also serves in addressing our sustainability responsibilities.

Uncertainties

The uncertainties mentioned in the original report remain relevant. These were the accuracy of reported trends from outside sources which may result in evaluating risks which do not occur (e.g. wetter winters which, while experienced in the West of Scotland did not affect the East Coast) and the fact that the effects of the Climate Variables given in the Risk Assessment table were the perceptions of the staff who based their input on their experiences, this could mean the exclusion of climate change events not apparent to them. The collection of the extreme weather events data will serve to either reinforce their perceptions or perhaps give rise to others being identified but this has not been the case so far. It is intended that a further round of interviews will be conducted with senior managers in a similar fashion to those carried out originally. This will show any perceptions which have changed and also provide a platform for new staff to have an input. This has been added to the Action Plan to be carried out by QHSE Dept.

A new uncertainty may be manifest in the data collection regarding people's differing perception as to what constitutes extreme weather. This has been addressed to some degree by recording only those weather events which prevent the organisation from carrying out a planned activity or where damage has occurred.

Barriers

The barriers included in the original report centred around lack staff engagement and management support. Neither of these have been realised as major barriers in that staff are engaged in the data collection process and other actions identified in the summary table of climate change risk assessment and associated action plan and management support has been exhibited in the provision of resources to effect mitigating actions. No new barriers have been identified.

Interdependencies

The key interdependencies identified in the original report were based around legislational changes that various UK and International agencies may introduce relating to Climate Change and how they would impact on the NLB. Several means were given in the original report as to how we would monitor these changes but in addition to those given there is now a Commissioner tasked with a specific responsibility to act as the NLB Board's representative for Transport Scotland which is the national transport agency of Scotland and will give us closer links with decisions made by the Scottish Government and their potential effect on NLB's activities including our adaptation to climate change decisions. Another interdependency identified in the first report was the projection that the UK lighthouse estate in general would decrease in size due to technological advances and so reduce its exposure to the effects of climate change, this is still seen as being valid.

The final interdependency previously identified was our reliance on some specialist suppliers and the negative effect that climate change may have on them and their ability to maintain their supply. As well as ensuring the stability of our suppliers at tender stage in the procurement process to mitigate against this threat, the NLB maintains a store of spare components where these are of a specialist nature and/or sourced from a single supplier which would give us time to identify another supplier or modify the design to eliminate the use of the components at risk.

Interdependencies (cont'd)

Another interdependency which could be considered is a disruption to the power supply. All lighthouses which have mains electricity as their primary source of power have back up systems in place to generate power if the mains supply is disrupted, the office buildings would be affected more but would cope (e.g. by moving to unaffected areas if there was no supply for an extended period). Operations at our Oban Base in regards to refurbishment of buoys would be most affected by a prolonged outage of mains power as this is a very specialised activity and could not be transferred to another facility without great difficulty. In this case the preferred solution would be to deliver our buoys to Trinity House's buoy yard in Harwich or Swansea for refurbishment.

When our technicians are out working on remote sites they are reliant on mobile phones for communication with other parts of the organisation, should the mobile signal fail at these sites then the NLB have a number of satellite phones as back up.

Although our ships call at various ports around the coast of Scotland they are not totally dependent on any of them as we have a pier in Oban Bay which is not appreciably susceptible to adverse conditions (e.g. storm surges or tidal movements) and so could be used when other ports may be inaccessible. Our ships are dependent, however, on the supply of marine diesel for their power and a shortage of fuel may present disruptions to planned activities and attendance at outages (especially buoys). It is assumed, however, that if there was a shortage of such fuel then the government would prioritise availability to those services which are seen as providing an essential service and that the NLB would be included in this.

NLB personnel do use transport links (air, rail, ferry, and road) to access various sites around the country, if one or more of these links were disrupted then alternative means of access would be found including the use of the ships or the contract helicopter if the situation demanded.

The NLB is dependent on the Light Dues paid into the General Lighthouse fund by ship owners when their vessels enter the ports and harbours around the UK. If certain climate change conditions resulted in a decrease of ship traffic then the resultant loss of income would have a detrimental impact on the money allocated for planned operations. These would then have to be prioritised for the most effective use of the available funds. The mariner is not wholly dependent on the NLB's Aids to Navigation in normal circumstances and may only use them as a secondary means, as a check on the position given by GPS for example. If climate change conditions were to impact on the provision of GPS for a prolonged period, however, then the Aids to Navigation provided by the NLB would be the principal means of navigation for the mariner.

Monitoring and Evaluating

Consideration of climate change risks has been well embedded in the organisation with a lot of staff actively engaged in collecting and reporting extreme weather data. The Risk Assessment and Management action plan is reviewed regularly thus keeping the profile of climate change fairly high and also means that the actions contained within it are being managed to ensure their implementation. Most actions are continuing on track, there has been some slippage on items relating to the re-furbishment of the Headquarters building in Edinburgh due to some extra building work being required to rectify earlier repairs.

There is sufficient flexibility built into the process to allow for changes in direction to be handled without undue concern. No financial benefits have been realised so far, however as data is collected and any trends identified this may result in benefits being realised via more informed forward planning resulting in e.g. fewer days lost.

No business opportunities due to climate change have presented themselves as yet.

Summary

As can be seen from The Climate Change Risk Assessment and Management Action Table the NLB does not consider that its operations will be at great risk from the impacts of climate change, the highest overall risk factor being a 4 out of a worst case scenario of 9. One of the potential impacts with a risk factor rating of 4 is an increase in cloud cover/lack of sunlight for our stations with solar panels. The work being done in adapting the design of Photovoltaic (PV) and battery systems for future installations and retrospectively upgrading current vulnerable stations is mitigating this risk. The other potential impacts with a risk factor of 4 concern extreme weather conditions and data is currently being collected to give an indication of the scale of the risk and discover any trends. Several of the short term actions to mitigate actual or forecast climate change impacts have been completed. The table will continue to be reviewed and maintained and the data collection concerning effects of extreme weather conditions on our activities will carry on. This is seen as a long term process, however, and the implementation of some of the proposed long term mitigating actions will depend on the results of the data collection, the realisation of forecast climate changes and other variables such as the future of the organisation resulting from changes and improvements in navigational technology.

RISK ASSESSMENT COLOUR CODING

A 3*3 severity of climate change impact / likelihood of event occurrence matrix was utilised.

Severity was defined as when the climate change impact affected

- Stakeholder expectations,
- Service provision,
- Staff;
- Premises,
- Processes,
- Financial,
- Support services. and
- Management.

The level of severity was considered to be where:-

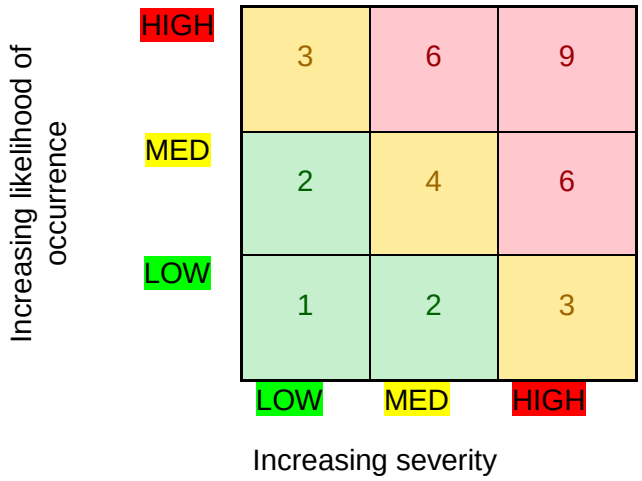
- Low severity = 1 = minimal effect on service provision, staff, premises etc with a cost effect <£5000;
- Medium severity = 2 = moderate effect on service provision, staff, premises etc with a cost effect between £5000 and £50,000;
- High severity = 3 = significant effect on service provision, staff, premises etc with a cost effect >£50,000;

Likelihood was defined relative to the timescale within which the climate change would first

manifest its impact on service provision, staff, premises etc and where:-

- Low likelihood = 1 = climate change impact is expected to manifest itself in the long term 2050 to 2100;
- Medium likelihood = 2 = climate change impact is expected to manifest itself in the Medium term 2020 to 2050;
- High likelihood = 3 = climate change impact is expected to manifest itself in the short term Present to 2020;

The climate change risk matrix is therefore as shown



The resultant business risk from climate change is ranked as shown in the following table

	Risk score 1, 2 = Trivial risk, climate change risk that can be managed by normal business adaptation methods with minimal operational intervention or effect;
	Risk score 3,4 = Tolerable risk that can be managed through normal business adaptation methods but has a medium to high severity on service provision etc and a medium to high likelihood of occurring in the medium term;
	Risk score 6,9 = Significant risk that cannot be managed through normal business adaptation methods, has a high severity on service provision etc and a high likelihood of occurring in the short to medium term;

The resultant impacts are shown in the Risk Assessment/Management Action Plan below. The severity, likelihood and final climate change business risk ratings are shown as colour codings in the relevant sections of the table.

Text in this colour – updated as at November 2015

SUMMARY TABLE OF CLIMATE CHANGE RISK ASSESSMENT / MANAGEMENT ACTIONS - **as at April 2016**

Business function Table Item Number	Climate variable (e.g. increase in temperature)	Primary impact of climate variable (e.g. health)	Threshold(s) above which this will affect your organisation	Likelihood of threshold(s) being exceeded in the future and confidence in the assessment	Resultant Business Risk Potential impacts on organisation and stakeholders	Proposed action to mitigate impact	Timescale over which risks are expected to materialise and action is planned
ENGINEERING MAINTENANCE 1	Increase in average wind speed each year	Increased inability to access marginal sites by sea or air Severity = 2	Sustained increase above current average wind speeds	Very likely over longer term with 80% confidence rating Likelihood = 1	Increase in standby time. Possible reduction in availability of AtoN Risk Factor = 2	Consider wind speed patterns and plan maintenance visits to marginal sites in low wind speed periods. **Data being collected by marine and engineering personnel when visiting lighthouse sites to record any weather conditions which disrupt or prevent scheduled activities with a view to identifying trends for use in future planning leading to less aborted visits and an associated reduction in expense and wasted use of resources. Continue collecting and analysing data.**	Risk Period =Long term – Action Plan = Present to 2020

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ENGINEERING MAINTENANCE 2	Increase in days of gales each year. Particularly in the North and West of Scotland.	Increased inability to access marginal sites by sea or air Severity = 2	Sustained increase in No of days of gale strength winds above current statistics.	Likely although No. of days increase considered to be small. 80% confidence rating. Likelihood = 1	Increase in standby time. Possible reduction in AtoN availability Risk Factor = 2	Consider planning maintenance visits to marginal boat and air access sites out with high gale periods. **Data being collected by marine and engineering personnel when visiting lighthouse sites to record any weather conditions which disrupt or prevent scheduled activities with a view to identifying trends for use in future planning leading to less aborted visits and an associated reduction in expense and wasted use of resources. Continue collecting and analysing data**	Risk Period =Long term – Action Plan = Present to 2020
ENGINEERING MAINTENANCE 3	Slight increase in cloud cover in North Scotland. Remainder nominally no change.	Solar PV provision may be insufficient to maintain battery charge. Severity = 2	Threshold limits have shown to be extremely variable. These need to be assessed annually.	This situation is already occurring in certain areas. Very likely. 100% confidence rate Likelihood = 2	Reduction of availability of AtoN. Risk Factor = 4	**Adapt** design of Photovoltaic (PV) /battery future installations **and retrospectively upgrade current vulnerable stations.** **(See 10. below)**	Risk Period = Medium term – Action Plan = Present to 2020
ENGINEERING MAINTENANCE 4	Increase in the length of the growing season.	Increase in grounds maintenance and ditch clearing activities. Severity = 1	Increase > 20 days - /budget + 10%	Very likely. 90% confidence rate. Likelihood = 1	Increase in grounds maintenance costs up to £5,000 Risk Factor = 1	Monitor budget costs and review for each corporate plan.	Risk Period =Long term – Action Plan = Present to 2020

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ENGINEERING MAINTENANCE 5	Rise in sea levels	Possible loss/damage of some minor lighthouse stations. Severity = 3	Not known at present	Likely – 50% confidence rate. Likelihood = 1	Loss of AtoN. reduction of availability. Risk Factor=3	Consider a survey of lighthouse estate to quantify impact. **Data being collected as occurrences of change to sea level become apparent. Once sufficient data has been collected, this will be used to inform preventative measures or changes to design.**	Long term impact may not materialise until 2050 onwards. Action Plan - Prepare schedule by 2020. **The design of lighthouses is such that the tidal rise of less than a metre would not be a risk. A tidal rise of over 2m would be high risk.**
ENGINEERING MAINTENANCE 6	Increase in storm surges.	Loss of access infra structure. Increase in undermining of Foreshore based structures i.e. Fladda Severity = 3	Not known at present	Likely – 70% confidence rate. Likelihood = 1	Increase in civil maintenance burden. Risk Factor = 3	Consider implementing a register of at risk AtoN's to quantify impact. **Data being collected as occurrences of storm surges become apparent. Once sufficient data has been collected, this will be used to inform preventative measures or changes to design.**	Long term impact may not materialise until 2050 onwards.

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ENGINEERING MAINTENANCE 7	Increase climate driven waves	Loss of access infra structure. Increase in undermining of Foreshore based structures i.e. Fladda Severity = 3	Not known at present	Likely – 70% confidence rate. Likelihood = 1	Increase in civil maintenance burden and change in mode of access. Risk Factor = 3	Consider implementing a register of at risk AtoN's to quantify impact. **Data being collected as occurrences of changes in wave activity become apparent. Once sufficient data has been collected, this will be used to inform preventative measures or changes to design.**	Long term impact may not materialise until 2050 onwards.
ENGINEERING PROJECTS 8	Increase in average wind speed each year	Increased inability to access marginal sites by sea or air Severity = 2	Sustained increase above current average wind speeds.	Very likely over longer term with 80% confidence rating Likelihood = 1	Increase in standby time. Increase in contractors costs. Slippage in planned project work. Risk Factor = 2	Ensure marginal site works can start as early in the year as possible to reduce exposure to seasonal winds. **Data being collected by marine and engineering personnel when visiting lighthouse sites to record any weather conditions which disrupt or prevent scheduled activities with a view to identifying trends for use in future planning leading to less aborted visits and an associated reduction in expense and wasted use of resources. Continue collecting and analysing data.**	Risk Period =Long term – Action Plan = Present to 2020

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ENGINEERING PROJECTS 9	Increase in days of gales each year. Particularly in the North and West of Scotland.	Increased inability to access marginal sites by sea or air Severity = 2	Sustained increase in No of days of gale strength winds above current statistics.	Likely although No. of days increase considered to be small. 80% confidence rating. Likelihood = 2	Increase in standby time. Increase in contractors costs. Slippage in planned project work. Risk Factor = 4	Ensure marginal site works can start as early in the year as possible to reduce exposure to seasonal winds. **Data being collected by marine and engineering personnel when visiting lighthouse sites to record any weather conditions which disrupt or prevent scheduled activities with a view to identifying trends for use in future planning leading to less aborted visits and an associated reduction in expense and wasted use of resources. Continue collecting and analysing data**	Risk Period = Medium term – Action Plan = Present to 2020
ENGINEERING PROJECTS 10	Slight increase in cloud cover in North Scotland. Remainder nominally no change.	Solar PV provision may be insufficient to maintain battery charge. Severity = 2	Threshold limits have shown to be extremely variable. These need to be assessed annually.	This situation is already occurring in certain areas. Very likely. 100% confidence rate Likelihood = 2	Increase in project costs Risk Factor = 4	Design of PV/battery configuration to be considered for new/upgrade to AtoN's **Significant improvements to survivability of solar installations have been made with an increase in the size of batteries/solar modules & reduction in power demand with smaller wattage lamps or change from traditional lamps to LED units.** **(See 3. Above)**	Risk Period = Medium term – **Design work complete.** Installation Action Plan = Present to 2020

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ENGINEERING PROJECTS 11	Increase in storm surges	Change to access infra-structure; Increased potential for undermining of structure Severity = 3	Not known at present	Likely – 70% confidence rate. Likelihood = 1	Requirement to take account of changes during design process. Risk Factor = 3	Reference to the register of at risk AtoN's. **Data being collected as occurrences of storm surges become apparent. Once sufficient data has been collected, this will be used to inform preventative measures or changes to design.**	Long term impact may not materialise until 2050 onwards.
ENGINEERING PROJECTS 12	Increase in climate driven waves.	Change to access infra-structure; Increased potential for undermining of structure Severity = 3	Not known at present	Likely – 50% confidence rate. Likelihood = 1	Requirement to take account of changes during design process. Risk Factor = 3	Reference to the register of at risk AtoN's. **Data being collected as occurrences of changes in wave activity become apparent. Once sufficient data has been collected, this will be used to inform preventative measures or changes to design.**	Long term impact may not materialise until 2050 onwards.
MARINE – NLB OBAN SUPPORT SERVICES 13	Increase in average temperatures during the warmer months	May reduce the duration of manual tasks due to heat fatigue. Severity = 1	> 22° C	Very likely - 80% confidence rate. Likelihood = 2	Reduction in efficiency of Buoy maintenance activities. Risk Factor = 2	Consider amending programme of works to the cooler parts of the day when appropriate. **This has not been required as yet but is still seen as a consideration.**	Risk Period = Medium term – Action Plan = Present to 2020

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MARINE – NLB OBAN SUPPORT SERVICES 14	Increase in maximum daily temperature during late summer/autumn	May result in heat stress to some staff in office accommodation. Severity = 1	> 22º C	Occurs at present. Very likely. 100% confidence rate. Likelihood = 2	Cost implications reduced. Motivation of staff. Reduced efficiency. Health effects. Risk Factor = 2	Consider additional cooling equipment within office facilities. **This has not been required as yet but is still seen as a consideration.**	Risk Period = Medium term – Action Plan = Present to 2020
MARINE – NLB OBAN SUPPORT SERVICES 15	Increase in the length of growing season	Increase in grounds maintenance requirements. Severity = 1	Increase > 20 days or budget + 10%	Very likely 90% confidence rate. Likelihood = 2	Increase in grounds maintenance costs up to £5,000 Risk Factor = 2	Monitor costs and amend budget for future corporate plans. **No increase in costs seen as yet. Continue to monitor.**	Risk Period = Medium term – Action Plan = Present to 2020
MARINE – NLB OBAN SUPPORT SERVICES 16	Reduction in frost conditions	Reduced demand of frost setting to heating system. Severity = 1	> 0º C	Very likely, however current weather patterns raise concerns. 50% confidence level. Likelihood = 2	Reduction in heating costs per annum of £5,000 Risk Factor = 2	Monitor external temperatures & forecasts. **The last two winters have been milder than normal, however a new, more efficient boiler heating system has been installed which is also more controllable and so will result in a reduction in heating requirements and costs. Continue to monitor.**	Risk Period = Medium term – Action Plan = Present to 2020
MARINE – NLB OBAN SUPPORT SERVICES 17	Decrease in snow cover	Reduction in resource implication Severity = 1	Current trend indicates a reduction in the No of days of snow cover over 50% of area	Likely – < 50% confidence rate based on past 3 years winter weather. Likelihood = 1	Reduction in budget for grounds maintenance snow cover. Risk Factor = 1	None required – benefit No Change	Risk Period = Short term – Action Plan = Present to 2020

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MARINE – NLB OBAN SUPPORT SERVICES 18	Increase in storm surges	With increased water levels around base location reaching + 3.3m Severity = 2	Current level + 1.5m	Likely - 75% confidence rate. Likelihood = 1	Storm surges may affect ability for berthing and storage on pier. Risk Factor = 2	Maintain records of **instances of raised** water heights due to storm surges. **Water heights are measured at the NLB pier by instrumentation installed by SEPA, NLB has access to data. No appreciable increase noted in storm or tidal surges, NLB pier in Oban is not at appreciable risk from storm or tidal surges however piers in other areas close by may be, this could result in a benefit for NLB Oban with more vessels berthing at the pier.**	Medium term - 2020 to 2050. Put in place tidal surge monitoring by 2020/ **Monitoring in place, continue to review data.**
MARINE – NLB OBAN SUPPORT SERVICES 19	Climate driven changes in waves.	Increased in wave height to + 1.0m Severity = 1	Not known at present	Likely - 50% confidence rate. Likelihood = 2	Increased wave height may affect buoy chain wear levels due to thrashing. Risk Factor = 2	Maintain records of chain wear. Identify upward trend in wear. **Records being maintained by ships, no appreciable difference noted, continue monitoring.**	Medium term - 2020 to 2050. Implement monitoring by 2020. **Monitoring in place, continue to review data.**

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MARINE – NLB OBAN SUPPORT SERVICES 20	Increase in sea temperature and salinity	Increase in marine growth on buoyage Severity = 2	Bi-annual visit indicating buoy sitting lower in water.	Likely - 50% confidence rate. Likelihood = 2	Increased in frequency of buoy maintenance visits. Risk Factor = 4	**Consider** a monitoring and reporting system re marine growth observed **on buoys. Monitoring is being carried out by SAMS (Scottish Association for Marine Science), data available to NLB on request, no need for NLB Oban to monitor.**	Medium term - 2020 to 2050. Implement monitoring 2020 onwards. **Monitoring in place, continue to review data.**
MARINE NAVIGATION 21	Storm Surges	Impact upon other AtoN agencies inspected by NLB officers Severity = 2	Not determinable	Likely - < 50% confidence rate. Likelihood = 1	Reduction in resource requirement. Reduction in MSA section 197 supervision Risk Factor = 2	Regular monitoring of Local Light Authority (LLAs) establishment / disestablishment arrangements. **There is currently no obvious pattern/trend of increasing storm surges from LLAs. Any major weather event that causes an AtoN failure would be discussed at audit by NLB and recorded in the NLB Annual Report on LLAs that is sent to the DfT**	Long term – 2050 onwards. Implement monitoring rate from 2020 **Monitoring in place, continue to review data.**

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FACILITIES & ADMINISTRATION (HQ 22	24 hour maximum temperature	Overheating to south and west facing areas of the office Severity = 1	> 22º C for 5 consecutive days.	Imminent 90% confidence rate Likelihood = 3	Heat stress effects on staff in affected areas. Reduction in efficiency. Unbudgeted expenditure Risk Factor = 3	**Portable air cooling devices were trialled in the Board Room but discontinued due to the noise (sent to Oban). No recent requirement.** Consider solar **coating within new windows** to south and west facing areas of the building **during refurbishment.**	Risk Period = Short term. - **To be revisited as/when weather requires.** Action Plan = Action for **2016** during **window** refurbishment. **In progress, to be complete early 2016**
FACILITIES & ADMINISTRATION (HQ) 23	24 hour maximum temperature	Overheating of server room. Severity = 2	> 22º C	Very Likely 90% confidence rate Likelihood = 2	Server room suffers from overheating when external temperatures are excessive. Risk Factor = 4	Consider use of additional air cooling units - £5-10k. **Current units >10 years old, new replacement units currently being sourced to upgrade to more energy efficient air cooling units , this removes requirements for additional units.** Consider increase in size of server room as part of 84 George Street refurbishment. **Not required due to purchase of new modern units.**	Risk Period - Short term – Action Period - **In procurement stage, to be completed 2016**

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FACILITIES & ADMINISTRATION (HQ) 24	Increase days of heavy rain	Increased discharge to existing drainage systems – localised flooding Severity = 1	Increase in No of days of heavy rain over current levels.	Likely > 75% confidence rate. Likelihood = 1	Maintenance of existing drainage system - cost increase £1-2k Risk Factor = 1	Program cleaning of existing drainage and systems to 2 x/year. Increase frequency of roof covering inspections.	Risk Period = Short term. - Action Plan = Immediate action for Autumn 2011. **Complete**
FACILITIES & ADMINISTRATION (HQ) 25	Increase of days of gales each year	Damage to roofing materials/structural damage to historical building. Severity = 1	Any increase above days of gales experienced at present.	Very likely >80% confidence rate. Likelihood = 2	Increase in damage to roofing materials, chimney stacks etc. Risk Factor = 2	Examination of exposed areas at regular intervals particularly before traditionally seasonal gale periods.	Risk Period = Short term Action Plan = With immediate effect. **Complete**
FACILITIES & ADMINISTRATION (HQ) 26	Increase in sunshine hours linked with increase in 24 hr. maximum temperature	May affect mastic asphalt roof coverings Severity = 1	> 22° C	Very likely 100% confidence rate (occurs at present) Likelihood = 2	Increase in expansion and thermal/UV damage to mastic asphalt roofing – increase in maintenance costs. Risk Factor = 2	Increase inspection regime. Maintain high levels of solar reflective coatings. **Review and replace/repair as required during refurbishment** **4 roofs (Commercial Hub, Ex Drawing Office; 3rd floor; Workshop)**	Risk Period = Short term Action Plan = **maintenance in short term**. **Workshop roof replace during refurbishment - 2016**
FACILITIES & ADMINISTRATION (HQ) 27	Extreme weather effects – Snow cover	Damage to high level gutters Severity = 2	> 150mm snow cover	Extreme snow cover has been experienced in **recent past** winters contrary to expected trend analysis. Low confidence rate in trend. Likelihood = 2	Damage to gutters resulting in a hazard to staff and public Risk Factor = 4	Structural integrity. **Review and replace/repair as required during refurbishment**	Risk Period = Short term Action Plan = With immediate effect. **During 2016 window replacement whilst scaffolding in place.**

Business function Table Item Number	Climate variable (e.g. increase in temperature)	Primary impact of climate variable (e.g. health)	Threshold(s) above which this will affect your organisation	Likelihood of threshold(s) being exceeded in the future and confidence in the assessment	Resultant Business Risk Potential impacts on organisation and stakeholders	Proposed action to mitigate impact	Timescale over which risks are expected to materialise and action is planned
HUMAN RESOURCES 28	Extreme weather events – snow cover and high rainfall	Increased disruption to staff and service provision. Increased risk of accidents to staff/public/plant/ property. Severity = 2	Extreme weather contrary to trend analysis	Extreme weather events – snow cover has occurred in **recent past** winters contrary to the expected decrease in days of snow cover. Increased rainfall in recent past years has resulted in landslips affecting road travel in areas of our business. Likelihood = 2	Disruption to staff travel to and from work affecting staff attendance. Potential delay in service maintenance. Staff frustration and stress. Risk Factor = 4	Impact is managed via existing business continuity management plan.	Risk Period = Short term Action Plan = With immediate effect. **Complete**
QUALITY, HEALTH & SAFETY & ENVIRONMENT (QHSE) 29	Increase in cooling degree days	Staff health Severity = 1	> 22º C	Very likely (already occurs) 100% confidence rate Likelihood = 3	Heat stress to staff in affected areas of building. Reduction in staff efficiency, comfort etc. Risk Factor = 3	Ensure staff know how to ventilate the workplace effectively. Ensure facilities have the required equipment to cool areas. Consider solar reflecting film to south and west facing elevations.	Risk Period = Short term Action Plan = With immediate effect. **Complete**
QUALITY, HEALTH & SAFETY & ENVIRONMENT (QHSE) 30	Increase in days of heavy rain each year	Disruption to travel plans. Increased discomfort. Staff safety. Severity = 2	Increase in days of heavy rain above current levels.	Likely > 75% confidence rate Likelihood = 2	Disruption to service provision due to travel disruption on maintenance visits. Demand for alternative PPE. Risk Factor = 4	Prepare detailed guidance on staff responses to extreme weather.	Risk Period = Short term Action Plan = With immediate effect, guidance to be prepared 2011. **Complete**

Business function Table Item Number	Climate variable (e.g. increase in temperature)	Primary impact of climate variable (e.g. health)	Threshold(s) above which this will affect your organisation	Likelihood of threshold(s) being exceeded in the future and confidence in the assessment	Resultant Business Risk Potential impacts on organisation and stakeholders	Proposed action to mitigate impact	Timescale over which risks are expected to materialise and action is planned
QUALITY, HEALTH & SAFETY & ENVIRONMENT (QHSE) 31	Increase in extreme weather events – snow cover	Disruption to travel plans. Increased discomfort. Staff safety. Severity = 2	Extreme weather event contrary to current trends analysis	Extreme weather events – snow cover has occurred in **recent past** winters contrary to the expected decrease in days of snow cover. Increased rainfall in the recent past years has resulted in landslips affecting road travel in areas of our business. Likelihood = 2	Disruption to staff travel to and from work affecting staff attendance. Potential delay in service maintenance. Staff frustration and stress. Risk Factor = 4	Impact is managed via existing business continuity management plan. Prepare detailed guidance on staff response to extreme weather.	Risk Period = Short term Action Plan = With immediate effect, guidance to be prepared 2011. **Complete**
QUALITY, HEALTH & SAFETY & ENVIRONMENT (QHSE) 32	Increase in sunshine hours	Staff health Severity = 1	Increase in sunshine hours greater than current trend.	Likely > 75% confidence rate Likelihood = 2	Staff working outside may be exposed to increased levels of UV radiation. Risk Factor = 2	Prepare guidance on working in sunshine.	Risk Period = Short term Action Plan = With immediate effect. **Complete**
QUALITY, HEALTH & SAFETY & ENVIRONMENT (QHSE) 33	Change in perceptions / perceptions of new staff not taken into account	N/A	N/A	N/A	N/A	Carry out another round of interviews with Senior Management	To be completed before next progress report - 2018
QUALITY, HEALTH & SAFETY & ENVIRONMENT (QHSE) 34	N/A	N/A	N/A	N/A	N/A	Carry out analysis of collected data relating to extreme weather conditions to identify trends and test assumptions	During 2020