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cutting through complexity

Feasibility Study for the Resettlement of the British Indian Ocean Territory

Draft Report

13th November 2014

CONTENTS

ACRONYMS AND ABBREVIATIONS

BIOT	British Indian Ocean Territory
CCT	Chagos Conservation Trust
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPPZ	Environment Protection and Preservation Zone
FCMZ	Fisheries Conservation and Management Zone
ICCPR	International Covenant on Civil and Political Rights
IPCC	Intergovernmental Panel on Climate Change
MPA	Marine Protected Area
OCTs	Overseas Countries and Territories
SIDS	Small Island Developing Country States
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference
UNCLOS	UN Convention on the Law of the Sea
USAF	U.S. Air Force

1 INTRODUCTION AND BACKGROUND

1.1 The British Indian Ocean Territory

1.1.1 History and geography

The British Indian Ocean Territory (BIOT) lies about 1,609 kilometres east of Mahe (the main island of the Seychelles) and 1,287 kilometres north east of Port Louis in Mauritius. The territory, an archipelago of 58 islands, covers some 640,000 square kilometres of ocean. The islands have a land area of only 60 square kilometres and 698 kilometres of coastline. Diego Garcia, the largest and most southerly atoll and island, is 44 square kilometres. The terrain is flat and low and most areas do not exceed two metres in elevation.

The uninhabited Chagos islands were first discovered by the Portuguese in the 16th century. The French assumed sovereignty in the late 18th century and began to exploit them for copra, originally employing slave labour. By then, the Indian Ocean and its African, Arabian and Indian coasts had become a centre of rivalry between the Dutch, French and British East India companies for dominance over the spice trade and over the routes to India and the Far East. France, which had already colonised Réunion in the middle of the seventeenth century, claimed Mauritius in 1775, having sent its first settlers there in 1772; it subsequently took possession of the Seychelles group and the islands of the Chagos Archipelago. (Although the latter were not commercially important, they had strategic value because of their position astride the trade routes.)

During the Napoleonic wars Britain captured Mauritius and Réunion from the French. Under the treaty of Paris in 1814, Britain restored Réunion to France, and France ceded to Britain Mauritius and its dependencies, which comprised Seychelles and various other islands, including the Chagos Archipelago. All these dependencies continued to be administered from Mauritius until 1903, when the Seychelles group was detached to form a separate Crown Colony. The Chagos islands continued to be administered as a dependency of Mauritius until, with the full agreement of the Mauritius Council of Ministers, they were detached to become the British Indian Ocean Territory in November 1965. In return Britain paid a grant of £3 million to Mauritius in consideration of the detachment of the Chagos islands.

1.1.2 The Chagossians

The former workers/inhabitants were removed from the islands between 1967 and 1973 to make way for the building of the military facility. After the British Indian Ocean Territory had been created, the UK government gave Mauritius an undertaking to cede the Territory to Mauritius when it was no longer required for defence purposes. However, since the 1980s, successive Mauritian governments have asserted a sovereignty claim to the islands, arguing that they were detached illegally. The UK government rejects this claim. Mauritius is currently pursuing arbitration through the UN Convention on the Law of the Sea (UNCLOS) over the UK's right to declare a "no take" Marine Protected Area (MPA) around BIOT. This was established in 2010. The Territory has no permanent inhabitants and members of the UK and US armed forces, officials and contractors in the Territory spend only limited periods there.

Since 1978 there have been several cases brought against the UK government for the right of return and compensation to the former inhabitants. In 1982 the UK government paid £4 million (over £19 million in today's prices) to the Chagossians.

The UK government has expressed its regret about the compulsory evacuation of Chagossians from BIOT in the late 1960s and early 1970s. We do not seek to justify those actions or excuse the conduct of an earlier generation. What happened was clearly wrong, which is why substantial compensation was rightly paid. Both the British courts and the European Court of Human Rights have confirmed that compensation has been paid in full and final settlement.

In October 2008 the Law Lords upheld the 2004 British Indian Ocean Territory (Constitution) Order, made by prerogative Order in Council, as valid. This means that no person has the right of abode in BIOT or the right to enter the territory unless authorised[1]. Restoration of full immigration control over the entire territory was necessary to ensure the availability and full effectiveness of the territory for defence purposes in the light of a change of security circumstances since 2000 and our treaty obligations to the United States.

1.1.3 Previous resettlement research

In 2000 the UK government commissioned an independent feasibility study to look at resettlement on the outer islands. That feasibility study comprised the following phases:

- **Phase 1** was tasked with making an initial assessment of the feasibility of resettlement based upon the natural resources on the two outer atolls of Peros Banhos and Salomon.
- **Phase 2A** of the study, which took place in 2001, involved establishing equipment to generate long term information on local climatic conditions and tides, and their influence on the freshwater lenses on two of the islands within these two atolls.
- **Phase 2B**, which started in November 2001, was completed in July 2002. It involved assessments of groundwater resources, soils, fisheries resources, and the marine and terrestrial environment.

This study came down against the feasibility of resettlement. While the report concluded that short-term habitation for limited numbers on a subsistence basis would in theory be possible, it also emphasised that any long-term resettlement would be precarious and costly. The outer islands, which have been uninhabited for forty years, are isolated, low-lying and lack all basic facilities and infrastructure. The cost of providing infrastructure and public services could become a very heavy ongoing contingent liability for the UK taxpayer.

1.2 Aims and overview of this study

In March 2014, the British Indian Ocean Territory (BIOT) Administration commissioned KPMG to carry out a new feasibility study for the resettlement of BIOT. The feasibility study is being undertaken over a ten-month period between April 2014 and January 2015. It is being conducted by a multi-disciplinary team, who together have been tasked with preparing a neutral analysis of different options for the resettlement of BIOT.

For each option, the feasibility study is intended to consider the following:

- the likely cost to the UK Government of establishing and maintaining a settlement over periods of five, ten and twenty years;
- whether such a settlement could be economically self-sustaining and, if so, within what time period and under what conditions; and

[1] There is an important distinction between 'right of resettlement' (where Chagossians could live, if allowed to return), and 'right of abode' (where they could visit, temporally (but not live) if they wished).

- the associated risks, environmental implications and full costs of mitigation, in the event that resettlement takes place.

1.3 Structure of this draft report

This draft final report collates the work of the study team to date, and is divided into the following sections:

- section two provides an overview of the overall **approach and methodology** followed by the team;
- section three summarises the team's **key activities** and sets out the final list of resettlement options which the study will consider;
- sections four to seven **analyse the feasibility of resettlement**, looking at the key issues to be addressed against each of the different elements in the study's analytical framework; and
- section eight provides a **summary comparison** of the different resettlement options.

2 STUDY APPROACH AND METHODOLOGY

2.1 Guiding principles

2.1.1 A neutral analysis

The team has sought to obtain as much information as possible about the background to the potential resettlement of the BIOT. This includes the earlier feasibility study, all major related peer reviews, independent studies on resettlement and the documentation gathered as part of the initial stakeholder consultations that took place in 2013. This has enabled the team to establish a clear picture of the context in which the study has taken place. The team has, however, adopted a 'neutral' approach, starting afresh when analysing the expected costs and benefits of each resettlement option without being steered by the conclusions of others.

2.1.2 Open consultation

The process of consultation which began in 2013 has continued through the main phase of the study, and the team ran structured consultation events, both in the UK, Mauritius and the Seychelles, organised by the BIOT Administration and facilitated by Chagossian community leaders. In addition, views have continued to be requested by e-mail throughout the study. These has been important as a means to verify and confirm the findings of the team's desk research and interviews, and to start building a consensus on the likely way forward with the resettlement process.

2.1.3 Presenting findings in a clear and accessible way

The final output of this feasibility study is a report that sets out an economic and financial analysis of each resettlement option, to reflect the likely implications for the BIOT over the short, medium and long term. This report will addresses in detail the range of issues identified in analytical framework presented in section 2.2, and is supported by clearly defined estimates of capital costs, operating and maintenance costs and potential revenue streams for the BIOT.

The study team recognises the importance of ensuring that this report is easy for readers to follow, with a logical structure, providing context and presenting the findings in a clear and concise way. This is particularly critical given the sensitivity of this assignment. The report is therefore be presented in draft form so that it can be shared and considered by Chagossians and other key stakeholders.

2.2 Analytical framework

The study team analysed the different resettlement scenarios, using the framework set out below.

Table 2.1: Analytical framework

Area of analysis	Key questions/issues considered
1. Likely number, profile and expectations of returnees	■ How many Chagossians want to return to BIOT (either permanently or temporarily)? ■ What is the age profile of those who wish to resettle (this will be important in determining the facility and service requirements)? ■ What are the lifestyle expectations if resettlement takes place (e.g.: reasonably modern; subsistence; eco village; temporary pilot resettlement; scientific research station)?
2. Legal and political factors	What are the likely implications of the following: ■ agreements with the US Government, given their military presence on Diego Garcia? ■ the International Marine Reserve, established April 2010? ■ existing BIOT Ordinances? ■ human rights agreements?
3. Environmental impact of resettlement and vice versa	■ flora and fauna in BIOT and the MPA; ■ any international agreements; ■ human carrying capacity of the islands, and environmental evaluation of the different island and re-settlement options (i.e. impact of resettlement on the environment); and ■ climate change and other disturbances (i.e. impact of the environment on resettlement).

Area of analysis	Key questions/issues considered
4. Economic prospects	What are the opportunities for the following: ■ gainful employment (e.g., in agriculture, fishing, handicrafts; etc.)? ■ tourism (possibly requiring private sector involvement) in: eco-tourism, small exclusive resort (cf. Maldives), cruise-ship visits, research and scientific visits? ■ BIOT government employment? ■ income generation opportunities through BIOT government (e.g. stamps, coins, internet registration, etc.)? ■ the possibility of remittances and/or contributions from other sources (both public and private)?
5. Access issues	This is a major consideration, given the experience of other Overseas Territories (e.g., Pitcairn), so we considered options such as: ■ docking facilities, ■ an airstrip; ■ access through American facility (cf. Ascension); and/or ■ shipping facilities.
6. Training and administration requirements	■ The team assessed the skill sets that potential resettlers would bring.
7. Risks and uncertainties	■ There is likely to be a need for a comprehensive statement of the risks and uncertainties associated with the resettlement process. This would include the identification of potential mitigation measures, if any are required. This may, for example, involve a disaster management plan in case of extreme emergency (e.g. dramatic climate change, tsunami, etc.) and, as another precautionary measure, costing of coastal armament for shore protection to combat sea level rise; and ■ While the anticipated impacts and environmental threats from different resettlement impacts are examined, the only way that impacts can be actually determined is through environmental monitoring. Hence, an outline of a monitoring programme forms an integral part of the environmental assessment.

Area of analysis	Key questions/issues considered
8. Benchmarking with other islands	This would identify and draw comparisons to (i) other Overseas Territories (e.g. Pitcairn, St Helena, Ascension (which also has an American Basefacility), Montserrat, Tristan da Cunha, etc.; (ii) other islands with similar issues/problems around the world related to: USA, France, Australia, involving bases, mineral development, or which face similar environmental problems (e.g. Maldives), and such issues.

2.3 Key phases of activity

Phase I: consultation and data gathering. Once the inception phase was completed, the team began the main phase of the study, the aim of which was to consult with the Chagossians and to gather relevant data on the population, as well as on the carrying capacity and resources of the islands themselves through a visit to the Territory. Consultations with scientists and other specialists familiar with BIOT and other UK Overseas Territories have also been important. This has involved meetings or discussions and, in the case of environmental consultations, the administering of a questionnaire.

Attempts have already been made to survey the Chagossians, and to establish a clearer picture of the numbers who wish to return. The Howell Report of 2008 is one such resource, and the team undertook a thorough desk-based review of relevant materials and consultation papers before they began their fieldwork. The fieldwork was, nevertheless, critical, and involved face-to-face consultation events and the use of structured questionnaires to survey the Chagossians resident in the UK, Seychelles and Mauritius.

The aim of this was to understand, in more in-depth terms:

- how many people want to return, under what circumstances;
- the specific nature and likely timing of this return (either permanent or temporary);
- the age and economic profile of those who would consider resettling; and
- lifestyle expectations, based on current living standards in the Chagossians' respective locations.

Phase II: analysis. Having gathered relevant data through desk research and consultations, the team reconfirmed, cross-checked and verified information such as those wishing to return as well as undertaken a detailed analysis of the prospects for an economically self-sustaining community on BIOT, weighing the likely economic opportunities against the expected financial costs and environmental risks. We carried out a realistic assessment of opportunities for:

- gainful employment (e.g., in agriculture, fishing, handicrafts, etc);
- tourism (possibly requiring private sector involvement) in fields such as eco-tourism, the development of a small exclusive resort (cf. Maldives), cruise-ship visits, research and scientific visits;
- BIOT government employment;
- income generation opportunities through the BIOT; and
- the possibility of remittances and/or contributions from other sources (both public and private).

Alongside this we calculated the likely financial costs of resettlement and environmental implications, covering:

- access facilities;
- island transport;

- housing;
- schools and clinics;
- administration buildings;
- power generation;
- telecommunications; and
- water, sanitation and waste facilities.

Besides the capital costs of the above items, the team has also considered the question of operating costs, payment for services, as well as administration (e.g. any need for an expatriate doctor, teacher, etc.).

Phase III: production of the study report. The result of this work is presented initially in this draft feasibility study report, and sets out an analysis of the resettlement options, as well as full consideration of environmental risks. This reflects the likely financial implications over the short, medium and long term, and is supported by clearly defined estimates of:

- capital costs, including any contingent liabilities, especially for the first five years;
- annual operating and maintenance costs, including Chagossians employed in local government jobs;
- revenue and income from the following: payments for utility services; levies on tourists and visitors; import duties and taxes; land sales and fees; rents; other income (e.g. stamps, coins, internet registration, etc.);
- environmental-financial implications of the resettlement options and transport needs, including the costs of upholding BIOT ordinances and international legislation, environmental monitoring and also measures needed to combat sea level rise and coastal erosion plus estimated costs; and
- presentation of results in the form of a spreadsheet model over 20 years for each option, with sensitivity tests on key parameters.

The draft report will be circulated to those with an interest for final views before being finalised and published.

3 KEY ACTIVITIES AND RESETTLEMENT OPTIONS

3.1 Field visit to the British Indian Ocean Territory

The study team, including the environmental expert spent seven days in BIOT, visiting Diego Garcia and 13 of the outer islands, including Ile du Coin and Ile Boddam. The purpose of this field visit was to gather relevant data on selected islands within BIOT, and to seek input on the factors to be considered during any resettlement process from UK and US representatives on Diego Garcia.

The field visit enabled the team to develop a framework for assessing the viability of each island for resettlement. This framework takes into account a range of environmental and physical parameters such as, for example, ease of access, proneness to flooding, agricultural potential and the likely challenges to infrastructure development. It has subsequently been refined by the team and supplemented by other data sources, including the earlier feasibility study, in order to verify the team's findings and to identify any significant changes that have taken place on the islands over recent years.

Field visit observations and abridged key data sets for 14 Chagos Archipelago Islands inspected in May 2014 are summarised in Annex A16. The information summarises some of the important physical and environmental factors that will influence resettlement prospects for these islands. Key points are highlighted below. More comprehensive assessments and comparative evaluations of island (and resettlement) options, based on these and other environmental factors, are shown in sections 5 and 8.

All the islands are low-lying and most are classic coral cays (keys). Islands are situated on the rim of atolls, and there are no protected lagoonal islands. Consequently, most land is no more than one to a few hundred metres from a seaward-facing shore. Maximum elevations are generally around 2-3 m above high tide, except for islands having raised reef and with cliffs about 6 m above high tide. Seismic activity (upthrust) likely contributes to this.

- **Distances between islands**. Distance, whether from Diego Garcia or an outside point of 'origin', will influence transport times, costs and logistics in the event of resettlement. Direct distances are most relevant for air travel, while distances via 'waypoints' relate to sea travel and are longer.

- **Surface area, height and protection**. Island area influences the extent and type of resettlement options that can be accommodated. Besides Diego Garcia, BIOT islands larger than 150 hectares visited include only Eagle and Pierre; the previously inhabited island of Ile du Coin is approximately 130 hectares, while Boddam is slightly smaller, at hectares.

- **Maximum island length and orientation**. These features influence an island's potential suitability for a commercial and passenger airstrip. BIOT islands visited with a length of approximately $\geq$ 2 nautical miles, include Sudest, Eagle, Pierre and Diego Garcia. This minimum length is a commonly accepted threshold for commercial passenger aircraft (See Annex A3).

- **Former habitation of BIOT islands**. Only Diego Garcia is currently inhabited. Previous islands populated by Chagossians included Ile du Coin and Boddam; some other islands were also inhabited, temporarily, for example Sudest (abandoned), Eagle (abandoned)

and Diamant (former leper colony). Past inhabitation of an island provides some indication of its potential for resettlement.

- **Access to islands by sea and level of protection**. In the event of re-settlement, all such islands would need jetties/wharfs. Approach and ease of access for a small craft ranged from relatively easy (Sudest, Takamaka, Fouquet, Boddam) to difficult or extremely difficult (Eagle, Middle Brother, Ile du Coin, Nelson). Also important is the extent to which atoll rims are enclosed by islands and reef flats. The least protected islands visited are Eagle and Middle Brother (Great Chagos Bank) and the most protected – besides Diego Garcia – are Takamaka, Fouquet and Boddam (Salomon atoll)[2].

- **Vegetation cover and inland access**. Islands visited are typically fringed with Scaevola, coconut trees, shrubs and various hardwoods, extending variable distances inland. Some islands have relatively dense vegetation, impeding access inland (e.g. Sudest, Diamant, Moresby, Boddam), while others have less dense vegetation (e.g. Eagle, Ile du Coin, Yeye), sometimes as a result of past clearing.

- **Rainwater and groundwater**. In Diego Garcia, rainfall and aquifers meet freshwater needs (desalination is unnecessary), this groundwater, coupled with appropriate treatment and with additional rainwater harvesting from building roof run-off is a significant resource. Groundwater lenses and/or freshwater were evident on the islands visited. Values often ranged from 0.5 metres to 1.5-2 metres. Depths varied according to distance inland, rock porosity and tidal cycles.

- **Soil and agriculture potential**. The level of organic matter and extent/depth of humic layer provides indication of agriculture potential. This ranged from 2-4" on some islands (e.g. Sudest, Sipaille: limited soil quality) to >12" on others (e.g. Ile du Coin, Pierre, Takamata, Fouquet: richer soils). In some cases (e.g. Sudest and Ile du Coin) a clear link was evident between soil quality and past or potential for agriculture.

- **Inundation risk and overtopping by seawater**. This actual or potential hazard is highly relevant to agriculture as well as habitation and construction in general. For some islands, the risk appears relatively low (e.g. Sipaille, Middle Brother, Pierre, Yeye, Nelson), while for others the risk is substantial (e.g. Sudest, Eagle, Ile du Coin, Moresby, Diego Garcia – in certain areas).

- **Ecology, wildlife and conservation significance**. Of the islands visited, rats were universally present except on Middle Brother and Nelson. Seabird life was most prolific on these islands, especially Nelson. In terms of flora, Eagle and Middle Brother have biogeographic significance, as these islands represent the most southerly limit of Indian Ocean mangroves.

- **Disturbances and impacts**. Historic evidence of construction was limited to only a few of the islands visited, including Diego Garcia. More prevalent was accumulation of solid waste and beach debris, and in very high concentrations.

Of the 14 islands visited, Diego Garcia, Eagle and Pierre are the only islands of significant area (more than 150 hectares) and of sufficient size to potentially support a permanent Chagossian re-settlement. These islands and Boddam, although smaller, had been formerly inhabited, as was Eagle, although the latter was abandoned in the 1930s. It is suggested

[2] However, as noted in Section 5.2.3 lagoon waters in protected atolls are more prone to warming events, coral bleaching and mortality; this can lead to diminished reef health and undermining reef and island resilience.

that if resettlement is considered feasible by the FCO, the islands that might serve as provisional initial candidate sites are Diego Garcia, Ile du Coin and Boddam[3] [4]; Pierre (and possibly other islands) might be options in the event of any subsequent phase of resettlement, although at present relatively is known about this island.

3.2 Consultations and survey results

3.2.1 Consultations

Three members of the study team, including the social development and resettlement specialist, carried out initial consultations with the Chagossian community in Mauritius, Seychelles, Manchester, Crawley, and London between 21st June and 5th July. The purpose of this visit was to inform the Chagossian community of the study and consultation process, and to gather their views on this process and resettlement in general.

Methodology. The consultation process involved holding meetings with Chagossian representatives, group meetings with the wider Chagossian community, and one-on-one meetings with the wider community. Chagossians were also invited to submit formal papers or provide comments via email to the study team.

Three instruments were developed to collect information during the consultations:

- **Socio-economic questionnaire**: the questionnaire was designed to capture information about the Chagossian community on employment, views on education, health and the environment, and expectations about what resettlement might look like. This information obtained would enable the study team to better understand the Chagossian community and their expectations regarding resettlement.

- **Gender focus group guide**: recognising the diverse needs and experiences of women and trying to establish an environment in which women were as comfortable to be as open as possible, a gender focus group guide was developed. Due to the communities' belief that men and women shouldn't be interviewed separately, the offer of the gender focus group meeting was declined.

- **Community focus group guide**: the community focus group guide was developed to allow for a more free flowing conversation between the study team and members of the Chagossian community. It was designed to capture information on the Chagossians' expectations of what resettlement would look like, what issues matter the most to the community, and what life was like for the older generation when they lived in BIOT. The community focus group guide was the most successful tool in collecting information during the consultations and allowed the team to gather rich information which helped inform the study.

Key messages. The below table highlights the key issues from the consultations with the Chagossian community.

Table 3.1: Key messages from consultation with the Chagossian community

[3] These islands were also the ones considered most appropriate by respondents to the environmental questionnaire.

[4] Several Chagossians have expressed views that all BIOT islands should be potentially open for resettlement. However, for logistical and financial reasons, this would be unrealistic. In the event of resettlement, the 6 islands noted are seen as ones that might initially be most suitable, mainly for practical reasons. However, resettlement on some other BIOT islands in the future is not necessarily precluded. As noted in other parts of this report, many other factors also influence island suitability and prospects for any initial and potentially subsequent resettlement.

Theme	Key messages
General	• All attendees at consultations at all locations expressed a preference for returning to BIOT permanently. It was clear that temporary visits to BIOT is not an acceptable option for the Chagossians. • It was clear that the Chagossian community expect a standard of living similar to that of an average UK citizen. • Strong preference towards Diego Garcia being a part of the resettlement options. Chagossians expect the right to access all islands in BIOT.
Political/Legal	• The Chagossians in Mauritius suggested the idea of village councils as a means of Governance. • Agreed that there needs to be rules and regulations around fishing.
Environmental	• It was clear that the Chagossian community as a whole are very environmentally conscious. • The community would be willing to play an active part in maintaining the pristine environment of BIOT, including employment as environmental monitors. • Strong preference for green technology, especially regarding energy generation.
Social	• The community expects to have access to similar infrastructure to that currently on Diego Garcia. • The community expect pre-primary, primary, secondary, and tertiary education with access to universities in the UK. It was suggested that there should be university scholarships for Chagossians. • The community expects all basic NHS services with a clinic, hospital, and pharmacy. • The community would be happy to provide labour for maintenance of BIOT if the Government occurred the expense.
Economic/Livelihoods	• The Chagossian community had a wide range of employment skills including people who were electricians, drivers, maids, administrators, police, lawyers etc. • The community expressed a strong desire to be trained to develop skills that may be useful on BIOT if resettlement was to occur. • Strong preference towards fishing for subsistence and as an income generating activity. They also believed that fish processing would provide opportunities for employment • The community also believed that they could use coconuts for both subsistence and for generating income. • The community expect full access to the UK pension scheme. • General agreement that BIOT should be open to high-end tourism and eco-tourism.

In addition to the above key messages it is important to note that there were other 'non-resettlement study' related issues that the Chagossians consistently brought up in all meetings, these issues will need to be addressed before any potential resettlement occurs. Firstly, clarity will need to be given on who has the right to British citizenship, this is a priority concern of the Chagossians. Secondly, who gets the right to permanent residence in BIOT if resettlement was to go ahead needs to be defined. There is concern that a narrow definition of who gets the right to resettle would prevent some family members from resettling on BIOT.

Preliminary conclusions. The consultations with the Chagossian community was successful in providing the study team with key insights into what the Chagossians would expect of resettlement and how the Chagossians themselves can help ensure that any resettlement would be sustainable in the long run. The information gathered from the consultations helped the team to develop resettlement options, gauge what the environmental effect of resettlement would be and how to mitigate this, and formulate livelihood options for potential settlers.

It was clear that the Chagossians would not accept anything but a 'modern' standard of living comparable to that of the average UK citizen. Expectations were that they would have facilities comparable to that on Diego Garcia currently, with further UK standard education and health facilities. Information on what infrastructure and facilities they expected helped inform what the resettlement options looked like with all options laying out some sort of 'modern' lifestyle for any potential settlers. It was also clear that temporary visits to BIOT was not an acceptable solution to any Chagossian and therefore such visits were not included as a resettlement option.

The Chagossians were environmentally conscious and understood the risks any form of resettlement would have on the environment. The community were keen to agree to strict environmental monitoring and expressed a desire to be trained to help carry out this monitoring. They understood the risks of overfishing and demanded that green technology must be a part of resettlement, such as in energy generation. This enthusiasm for mitigating the impacts of any potential resettlement on the environment is a good start in ensuring the environmental sustainability of resettlement.

The wide range of employment skills present in the Chagossian community has allowed the team to develop multiple livelihood options for a resettled community. A combination of vocational job skills together with high level administrative and public service skills bodes well for the sustainability for any resettled community on BIOT. Embracing the idea of tourism also has the potential to open up a variety of employment opportunities.

Though these are issues out of the scope of the study, the topic of citizenship and who gets the right to return are prominent issues in the community which will have to be addressed before any resettlement goes ahead.

3.2.2 Environmental questionnaire survey

An environmental questionnaire was developed to seek views from stakeholders on the various environmental issues linked to resettlement. The questions contained within the tool relate broadly to the following: the carrying capacity of individual islands; the potential impact of resettlement on the environment; the impact of the environment on resettlement; and environmental monitoring requirements, should a decision to resettle be taken by ministers.Further results of stakeholder views, including results of quantitative analyses, are summarised in Annex 3.yy.

Table 3.2: Key messages from the environmental questionnaire

Theme	Key messages
Resettlement option by island	Respondents were asked which islands they would consider to be most suitable for resettlement given each of the resettlement options. Diego Garcia is clearly thought to be the most suitable Island for resettlement with respondents believing that a modern lifestyle, a pilot resettlement, or a scientific research station being the most suitable options for the island.
Research station	Respondents were asked to consider whether a research station in Chagos

Theme	Key messages
	would be an effective means of assessing environmental aspects of resettlement. 29 people said yes while only five said no. Examples were given of research stations in Aldabra, Seychelles, Laccadives, and Galapagos which could be used as models for a research station in BIOT. A large majority of respondents believed that there could be employment opportunities for Chagossians on the research station.
Impact of resettlement on the environment	Respondents were asked to determine the overall resilience/robustness of the islands and their reefs to resettlement impacts. Diego Garcia was thought to be the most resilient island to both subsistence and modern lifestyle resettlement, with a fairly even spread of people believing that Diego Garcia was either robust or fragile to both resettlement options. A large majority of respondents believed that Ile du Coin and Boddam are both fragile and unsuited to resettlement. All other islands were deemed 'fragile'.
Impact of environment on resettlement	Respondents were asked, over the next 50 years, how resilient/robust they thought different islands would be to absorb and recover from natural environment disturbances. The majority of respondents thought that all three islands were fragile and vulnerable to natural events such as sea level rise and coastal erosion. While Diego Garcia was seen as having some capacity to absorb damaging impacts, given its larger land area, nonetheless it was still thought to be vulnerable and only protectable through significant investment in shoreline protection.
Carrying capacity	Respondents were asked what they thought were the carrying capacities of the islands. For the modern lifestyle option Diego Garcia was assumed to have the largest carrying capacity, with the mean of the responses being 1,427 in a range of between 0-5,000. The mean assumed carrying capacity of Ile du Coin and Ile Boddam were both below 100. For the subsistence option Diego Garcia was also assumed to have the largest carrying capacity, with the mean of the responses being 363 in a range of between 0-3,000. The mean assumed carrying capacity of Ile du Coin and Boddam were again both below 100.
Environmental monitoring	A large majority of respondents thought that it was important that all listed types of environmental monitoring were necessary. Whether respondents thought Chagossians could be trained to carry out the environmental monitoring varied with each type of monitoring tool but the general consensus was that Chagossians could be trained to carry out environmental monitoring in some capacity.

3.3 Overview of resettlement options

The feasibility study inception report presented a series of three potential options. These have been revisited in light of the team's field research and consultations. These activities, in particular, indicated that:

- consultation experience has been variable, with strong demand for resettlement in some instances, but more modest expectations of numbers in others;
- likely infrastructure standards and access to basic service expectations akin to UK/other Mainland standards; and
- Diego Garcia remains a preferred location.

In light of this, the analysis in the remainder of this report will be focused on the following three options:

- **Option 1: Large-scale resettlement (with a population of approximately 1,500 in the first instance)**. This assumes a substantial settlement, with economic opportunities built around activities such as tourism and/or commercial fisheries. This form of resettlement would require infrastructure development on both Diego Garcia and the outer islands of the archipelago, in order to provide adequate support services for the returning population.

- **Option 2: Medium-scale resettlement (with a population of 500)**. This scenario envisages a medium-sized population of resettlers, whose livelihoods could be supported in a number of ways: for example, the management of the Marine Protected Area, activities such as artisanal fishing, or employment on the US military facility on Diego Garcia.

- **Option 3: Pilot, small-scale resettlement, with incremental growth over time (initial population of 150)**. This scenario serves as a middle ground between permanent substantial resettlement and the status quo. It would require some limited investment in infrastructure and facilities, likely on Diego Garcia, in order to enable interested Chagossians to return to BIOT on a pilot basis, allowing for incremental growth over time if the pilot is shown to be successful.

4 LEGAL AND POLITICAL ANALYSIS

4.1 Introduction and overview

4.1.1 Aims and objectives of this analysis

This section outlines the legal implications that a return of Chagossians to the BIOT would have. The current legal framework for BIOT is designed for islands uninhabited by anybody apart from those working on the US military facility on Diego Garcia. The legal framework for BIOT is therefore quite different to that in place for any of the other inhabited British Overseas Territories.

There are no insurmountable legal obstacles that would prevent a resettlement on BIOT. It will, however, be necessary to prioritise the legal provisions which require immediate change and those which can be put in place in the longer term. This section highlights the main legal areas which will require change should resettlement go ahead. It is imperative that any legal changes are made in consultation with the Chagossians themselves as well as other interested stakeholders.

This element of the study was undertaken through extensive research and consultation with several legal experts with broad knowledge of the legal framework of BIOT and British Overseas Territories more generally. This section includes a comparative analysis with the legal frameworks governing the other British Overseas Territories, and in particular those territories inhabited by a relatively small number of people such as Pitcairn, St. Helena, Ascension and Tristan da Cunha.

4.1.2 Legal background

BIOT is one of 14 territories under British Sovereignty now known as the British overseas territories. All of these territories are part of '*Her Majesty's dominions'* as territories which belong to the Crown and are also British possessions. The territories are constitutionally separate both from each other and from the United Kingdom, which is defined in the Interpretation Act 1978 as Great Britain and Northern Ireland. Nevertheless each of the territories are constitutionally linked with the United Kingdom as the sovereign power. Each territory has its own government and legislature. Laws can also be made for the overseas territories by United Kingdom Act of Parliament or by Order in Council made by Her Majesty on the advice of United Kingdom Ministers. These overseas territories are the remaining lands from the British Empire, with their legal foundations emanating from British colonial law.

4.1.3 The constitutional and legal framework of BIOT

Each British overseas territory has its own written constitution which has been passed by Her Majesty as an Order in Council by and with the advice of the Privy Council, upon the recommendation of United Kingdom Ministers. These Orders are based either upon the common law prerogative power of Her Majesty or, and sometimes in addition to, a statutory power. In only two cases, BIOT and Gibraltar, the constitutions are contained in Orders in Council made exclusively by virtue of the Royal prerogative. The British Indian Ocean Territory (Constitution) Order 2004 is the current constitutional framework in place for BIOT.

The BIOT constitution sets out the legal framework for the governance of BIOT. It establishes the office of the Commissioner who exercises executive power on behalf of Her Majesty for BIOT. The Commissioner may make laws for the peace, order and good

government of the Territory. The constitution makes allowance for the continued functioning of Courts on the islands as in existence before the constitution and makes certain directions for their future functioning. Importantly Article 9 of the constitution is clear that the main purpose of BIOT is for defence and that there is no right of abode for anyone on the territory:

> *9(1) Whereas the Territory was constituted and is set aside to be available for the defence purposes of the Government of the United Kingdom and the Government of the United States of America, no person has the right of abode in the Territory.*
>
> *(2) Accordingly, no person is entitled to enter or be present in the Territory except as authorised by or under this Order or any other law for the time being in force in the Territory.*

In addition to the constitution there is also statute law in force in BIOT comprising of Ordinances made by the Commissioner, and statutory instruments made under them, in addition to Orders in Council and Acts of the United Kingdom Parliament which have been extended to the Territory. Sections 3 to 5 of the Courts Ordinance 1983 are important to note as they allow for the incorporation of English statutes, common law and rules of equity in BIOT law insofar as they are applicable and appropriate to local circumstances. The present constitutional and governance framework for BIOT is designed for a territory with no permanent population.

In practice the position of Commissioner of BIOT is filled by a senior official in the Foreign and Commonwealth Office (FCO), who is assisted by an Administrator, both of whom are based in London within the FCO. The Commanding Officer of the Royal Navy/Marine contingent based on Diego Garcia acts as the Commissioner's Representative within the Territory.

In 1966 by Exchange of Notes between the US and United Kingdom governments a treaty was made defining use of the territory, and Diego Garcia in particular, by the two governments for defence purposes with the presumption being that the islands would have no permanent population. This treaty arrangement is open for amendment by both the UK and US governments from December 2014 to December 2016, when it is subject to the option for renewal for a further 20 years. Any resettlement will therefore require changes to the details contained in the treaty.

BIOT is also noted for its exceptional marine environment. In 2010 the United Kingdom government proclaimed a Marine Protected Area from the outer limit of the territorial sea (three nautical miles) to 200 nautical miles surrounding the islands. In addition, many other domestic legal restrictions are in place to protect the terrestrial environment and the coral reefs and inshore waters of BIOT. These legal protections have again been designed for a territory with no permanent population, although some pre-date the removal of the original islanders (e.g., The Green Turtles Protection Regulations 1968). Any resettlement will therefore require amendment to the environmental protection framework to allow for a settled population whilst also protecting the environment.

4.1.4 Adapting the legal framework to facilitate resettlement

Given the current legal framework for BIOT as outlined above it is clear that considerable amendment will be required to facilitate a sustainable resettlement of Chagossians. This section will focus on the following areas identified as being a high priority:

- the constitutional and governance framework;
- treaty arrangements between the US and the UK for the use of BIOT; and

- environmental protection laws and conventions.

4.2 Constitutional and governance framework

The current constitutional and governance framework for BIOT is designed for a territory used solely for defence purposes. If BIOT is resettled there are several areas of governance that will require immediate attention. The right of Chagossians to return and live on BIOT needs to be set out both in the constitution and related immigration ordinances. The status of Her Majesty's executive representative, either as Commissioner or Governor, as well as his powers and functions needs to be dealt with, as does the establishment of a representative body for Chagossians to advise and support the executive. The system for passing local laws and the establishment of a resident judicial system need to be developed. Other areas that require attention include the civil service, police and fundamental human rights protection.

4.2.1 Amending the constitution

Ascension, the British Antarctic Territory, the Falklands Islands, Pitcairn, South Georgia and the South Sandwich Islands, and Tristan da Cunha have their constitutional frameworks based upon the British Settlements Acts 1887 and 1945. BIOT was acquired by Britain by cession from France and therefore the British Settlements Acts cannot be used as the basis for any constitutional change to BIOT under the Acts' own definition. Other overseas territories that the British Settlement Acts do not apply to are St. Helena, Cayman Islands, Montserrat, the Turks and Caicos Islands, the Virgin Islands, Anguilla, Bermuda and Cyprus, all of which have the statutory legal basis for their constitutional frameworks based upon separate acts of the United Kingdom Parliament. As previously mentioned, BIOT and Gibraltar have their constitutions contained in Orders in Council made exclusively by virtue of the Royal prerogative. Any change therefore to BIOT's constitutional framework can be made either solely under the Royal prerogative or on the basis of a United Kingdom Parliamentary statute.

The issue of whether any new constitution for BIOT is based solely upon Her Majesty's prerogative powers or on a United Kingdom statute raises some interesting issues. The former is subject to judicial review on grounds of irrationality and procedural impropriety as has been shown in the high-profile cases relating to BIOT. It is also the case that a constitutional order made under statutory powers is likewise subject to judicial review, at least insofar as to determine whether it is within the powers granted by the parent Act. The most important potential difference is the possibility for the UK Parliament to make statutory provision for oversight of constitutional Orders in Council made on the foot of legislation. In the past Parliament has hesitated to do more than require Orders to be laid before Parliament after being made and others, such as the Saint Helena Act 1833, the Anguila Act 1980 and the Cyprus Act 1960, do not even have this requirement. Constitutional Orders made only on the basis of the Royal Prerogative are not required to be laid before Parliament. According, however, to Hendry and Dickson in British Overseas Territories Law:

> *Since 2002 political arrangements have operated whereby most constitution Orders have been sent in draft by the Foreign and Commonwealth Office to the House of Commons Foreign Affairs Committee where possible at least 28 sitting days before they were submitted to Her Majesty in Council. This procedure was not followed in the case of the British Indian Ocean Territory Constitution Order 2004.*

It remains a fundamental principle, however, that the United Kingdom Parliament has unlimited power to legislate for the overseas territories. Although it has not been done for any of the other British Overseas Territories it could be considered that a new constitution for

BIOT be passed directly by the UK Parliament. Given the unique circumstances relating to BIOT it may be considered appropriate to have more rather than less Parliamentary oversight over any new constitutional arrangements. A United Kingdom Act of Parliament is not subject to judicial review, which would perhaps make resettlement less likely to be delayed or made more expensive through potential litigation.

Under the present arrangements for passing a constitution by Order in Council the actual procedure is relatively straightforward. The new constitution is recommended to Her Majesty by United Kingdom Ministers with the Order formally made by Her Majesty based on the advice of Her Privy Council.

4.2.2 Amending the constitution: the consultative process

It should be highlighted that the practice in recent years has been to reach political consensus with the representatives of the territory concerned as to any constitutional changes. Hendry and Dickson make the point that almost all recent constitutional review negotiations have taken place on the basis of proposals emanating from the territories themselves. The need therefore to consult with Chagossians during the constitutional reform process is clearly established. Given the environmental significance of BIOT it would seem prudent to also consult with environmental stakeholders.

In other British Overseas Territories constitutional change has taken place after referenda, by resolution of the locally-elected body and by more informal local consultation. Given the challenges in carrying out effective consultation where the Chagossian population is so spread out it may be appropriate to consider a temporary constitutional framework to replace the existing one during the initial stages of any resettlement and at a later stage, when Chagossians living on BIOT have had the opportunity to gauge the needs of life on the islands, to adopt a more permanent constitution. Such an interim constitution should contain the basic provisions necessary to legally allow resettlement on BIOT and also to facilitate a temporary governance framework which would support the development of a permanent constitution. If the decision is taken to develop a temporary constitutional framework it will require consideration as to whether an open consultative process is required, perhaps through a representative conference, or whether in the interests of expediency only the bare minimal changes to the current framework are made with the understanding that a comprehensive consultative process will take place as soon as possible. It is suggested that a roadmap for this process could be set out in a policy paper to be agreed with Chagossian representatives rather than the details specifically included in any interim constitutional framework.

4.2.3 Towards a new constitution and legal framework

Nationality and right of abode. On 10 June 2004, Her Majesty by Order in Council enacted the Constitution Order and a separate Immigration Order. As mentioned previously these Orders specifically exclude any person from having a right of abode in the territory or from entering the territory without a permit issued by the Commissioner's representative.

The issue of BIOT nationality and subsequent right of abode is complicated due to the fact that since the 1970s Chagossians have been excluded from the territory and have been dispersed, mainly in Mauritius, Seychelles and the UK. Under the British Overseas Territories Act 2002 all British overseas territories citizens as of 21 May 2002 were granted British citizenship. By the same Act a person born after that date becomes a British citizen if, at the time of birth, his or her father or mother is either a British citizen or settled in the territory. Section 6 of the 2002 Act made special provision for Chagossians by conferring British citizenship and/or British overseas territories citizenship on persons connected by descent with the British Indian Ocean Territory with the conditions being that the person was:

- born on or after 26 April 1969 and before 1 January 1983;
- born to a woman who at the time was a citizen of the United Kingdom and Colonies by virtue of her birth in the British Indian Ocean Territory; and
- immediately before 21 May 2002 was neither a British citizen nor a British overseas territories citizen.

Under Part II of the British Nationality Act 1981 overseas territories citizenship may be acquired by birth or adoption in a territory, by registration or naturalisation in a territory, or by descent from a British overseas territories citizen. Under section 43 of the same Act the functions of the Secretary of State are delegated to territory Governors.

If resettlement goes ahead some Chagossians would not be eligible for British overseas territory citizenship based on the above legal framework. One example would be a child born to a Chagossian who themselves was not born on BIOT, which is quite common.

While it would be possible to allow for resettlement of Chagossians by granting of a temporary permit to reside in BIOT by the Commissioner's Representative, and this may be a viable short term option, the issue of BIOT citizenship and right of abode is one that will require immediate attention should resettlement go ahead. The issue of citizenship is an emotive one for all Chagossians and it is likely they will press for full citizenship rights and right of abode once any change in status is considered.

In some territories a status commonly known as 'belonger status' has been established whereby, under the constitution or local legislation, persons are given the right of abode in a territory. This status and its definition vary from territory to territory but it can be said to apply to two groups of people, those considered indigenous to the territories and those who have been granted the status, usually longer term residents, through means established under local legislation. It is common that 'belongers' have preferential rights with regards to employment, property rights and participation in local government such as the right to vote and right to hold public office. In any future constitution for BIOT this status could be used as a potential option to resolve issues surrounding the right of abode.

In some territories the right to protection against arbitrary deprivation of the right of abode in the territory and/or belonger status in the territory is included in the constitution. Given BIOT's unique circumstances this would also have to be considered an option in any changed constitution.

It should be stressed that Chagossians may have rights by virtue of their citizenship or residence in the United Kingdom or elsewhere. How these rights would be affected, if at all, by resettlement is not within the scope of this study.

Land rights. The Acquisition of Land for Public Purposes (Repeal) Ordinance 1983 repealed earlier Ordinances and declared that all the land in BIOT is Crown Land. One issue with resettlement will be dealing with perceptions of land rights over land formerly used and regarded as owned by Chagossian families. It is not practical that any individual rights to property should still exist but the issue may very well arise. One of the powers a Governor has under a territory constitution is power to dispose of Crown Land. Under Article 14 of the BIOT Constitution the Commissioner is delegated authority to dispose of land on behalf of Her Majesty. In the short-term, any resettlement will require development of a process to allocate use of land by the BIOT government to returning Chagossians.

Governor or commissioner. Under the existing Constitutional framework Her Majesty is represented in BIOT by a Commissioner who in practice is based in the FCO in the UK. In all

British Overseas Territories which are inhabited by permanent populations, rather than by scientific or military outposts, Her Majesty is represented by a Governor. It should be noted that the office of Governor of Pitcairn is in practice held by the British High Commissioner to New Zealand and is therefore resident in New Zealand. The Governor of Ascension and Tristan da Cunha is resident in and also Governor of Saint Helena. It would seem likely that in the event of resettlement a Governor would, at least in the longer term, be appointed but not necessarily resident in BIOT. One option would be to follow the Pitcairn example and give the role to the British High Commissioner in neighboring Mauritius.

In terms of definition of the role of Governor, Schedule 1 to the Interpretation Act 1978 is most concise:

> *'Governor', in relation to any British possession, includes the officer for the time being administering the government of that possession.*

This definition is broad enough to include the role of Commissioner as it currently exists for BIOT and in this section references to the powers of a Governor should be read as the same those a Commissioner would have. In essence, the Governor is the head of government of a territory. The Governor of any overseas territory is appointed by Her Majesty, and in almost all cases the appointment is made by Royal Commission on advice of Her Majesty's United Kingdom Ministers. Regardless of whether a Governor is appointed or whether the current position of Commissioner continues it is likely that senior civil servants will be required to take responsibility for managing the resettlement process based both in the UK and also in BIOT.

Local council. While the role and authority of the Governor is explained below, it is important to highlight that in all inhabited Overseas Territories some form of local council, cabinet or executive body – elected or appointed – is established by constitution to at the very least advise the Governor and in some cases to exercise limited executive and legislative functions. In most cases the limits on the powers of these local bodies are set out in implementing legislation rather than in the Constitution itself, presumably to allow for greater flexibility.

Case studies: Pitcairn and Ascension Island

In **Pitcairn** an island council is constituted by the constitution with members of the Island Council elected to office in free and fair elections held at regular intervals. In practice the Council has twelve members, seven of whom are elected including the Mayor, Deputy Mayor and five Councillors, all with voting rights. The other five members are the Governor, Deputy Governor, a Commissioner who liaises between the Council and the Governor and a Governor's Representative all of whom are non-voting ex-officio members of the council. The elected members of the Council and the Deputy Mayor all serve two year terms. The Mayor is elected for three years and can serve a maximum of two consecutive terms at a time. Subject to the orders and instructions of the Governor the island council may make, amend or revoke regulations for the good administration of the Islands, the maintenance of peace, order and public safety and the social and economic betterment of the islanders. The same Ordinance also lists a wide area of governance areas that the council can issue regulations on including public health, traffic, public works etc. It is important to note that the Governor can alter, vary or revoke any regulations made by the Island Council. The Mayor, as President of the Council, acts as Chief Executive Officer for the islands on behalf of the Governor. The position of Island Secretary and Government Treasurer are also established by this Ordinance.

Ascension Island's Council consists of the Governor, seven elected members, three ex-officio members including the Administrator, Attorney-General and Director of Resources with none of the three having a vote. Under the same Ordinance the Governor shall consult the Council in the formulation of policy in relation to the exercise of all functions conferred upon him in relation to or in respect of Ascension and acts in accordance with the advice given to him by the Council. However the Governor is not obliged to consult the Council in a variety of situations including where acting within his express discretion and upon instruction from the Secretary of State, and importantly the

Governor is not subject to judicial review in relation to a decision not to consult with the Island Council. In Ascension a Finance Committee is established and the Governor has the authority to establish other committees under the same Ordinance.

The issue of what kind of representative body is to be established for Chagossians needs to be agreed with any resettling population. It may be more realistic for a temporary consultative body to be put in place until a more permanent structure can be agreed and established by constitution or local Ordinance. The process for selecting the members of such a consultative body, temporary or permanent, will not be simple given the unique context of BIOT. It should, however, aim to be as representative as possible. It is suggested that such a body will, initially, have to include representatives of the Chagossian community from as many areas where they are settled as is feasible. In the future, once it is considered realistic to establish a permanent council, the question as to how to include the views of Chagossians living outside of BIOT, but with an expressed interest in resettling, will also have to be considered.

Role and authority of the Governor. The Governor's authority is limited to that conferred on him or her by the Crown, with whom executive authority rests, and by Acts of Parliament or other laws. The constitution of a territory is where the specific powers and duties of a Governor are set out. The Governor, in the exercise of those functions, is subject to judicial review in the overseas territory and in the UK.

In most territories the Governor exercises the role of executive authority in the territory on behalf of Her Majesty. In smaller territories where there is no elected legislative body, the Governor also fulfills the role of the legislature in the territory. Regardless of what powers may be delegated to any local council or other executive body, in all overseas territories the Governor retains specific special responsibilities. These responsibilities invariably include emergency powers, external affairs, internal security, defence and the public service.

- **Executive functions**. The constitution should specify which functions the Governor must exercise on instructions from Her Majesty or the Secretary of State, or after consultation, recommendation or approval from any local elected Cabinet or Executive Council as well as functions which can be executed without reference to any local person or body.

  Currently the BIOT Commissioner has authority to dispose of Crown land, to constitute public offices and the power of pardon. These are also common amongst other British Overseas Territories. Even in overseas territories with elected governments certain areas are reserved for the Governor including external affairs, defence, internal security and the appointment and removal of public officers. In other territories areas such as finance, administration of justice and shipping are also reserved for the Governor. In some of the larger territories a Ministerial system of government exists with the constitutions setting out what powers can be delegated by the Governor to Ministers. Similarly, in territories with elected legislative bodies the Governors have a constitutional power to dissolve that body, usually on the advice of the Premier or Chief Minister. Given the size of any potential resettlement it is not likely, at least in the short and medium term, for a Ministerial system or an elected legislature to be appropriate in the case of BIOT.

- **Legislative functions**. In overseas territories with no elected legislative body, as BIOT is currently, the Governor is constituted as the legislature by the Constitution and must act within the scope laid out in the constitution. Under BIOT's current constitution the Commissioner is given power to make laws for the peace, order and good government of the territory. For Ascension and Tristan da Cunha, the Governor has this legislative power but must first consult the Island Council in each case. The situation is similar in Pitcairn, however the Governor also has the power to make laws without consulting the Island Council when instructed to do so by a Secretary of State. In other territories with an

elected legislature, the Governor has a limited right of passing legislation based on prescribed procedures. Aside from this, a Governor's main role in territories with elected legislatures is that of giving assent to legislation passed. Given the scale of the resettlement options for BIOT, it would appear that the models from Pitcairn and Ascension and Tristan da Cunha are most relevant, where the Governor has legislative power but must usually consult with an island council.

Except in Gibraltar the constitutions of all British Overseas Territories contain a provision for Her Majesty, through a Secretary of State, to disallow any law enacted by legislature in those territories and this power is usually unlimited in scope. While this power is rarely exercised there is no reason to suggest it is not a power which should be included in any new BIOT Constitution.

As noted earlier Sections 3 to 5 of the Courts Ordinance 1983 allow for the incorporation of English statutes, common law and rules of equity in BIOT law in so far as they are applicable and appropriate to local circumstances. The provisions of this Ordinance are ambulatory in nature and would allow the legal framework of BIOT to evolve on a gradual basis without leaving any potential major legislative gaps.

- **Emergency powers**. In all overseas territories the Governor has considerable special powers in the event of an emergency which includes the power to declare an emergency and issue emergency regulations with the force of law during the period of emergency. These provisions should be included in any new constitutional arrangement for BIOT. In the Cayman Islands, the Virgin Islands and Montserrat the legal basis for these powers is in the Constitution while in other Overseas Territories it is set out in Orders in Council or local legislation.

- **Public service**. A major role for any Governor is responsibility for the Public Service. The Governor essentially has the authority over the Public Service and is responsible for the good government of the territory. Given that only a limited Public Service exists for BIOT, considerable discussion will have to go into planning to ensure that the Public Service is adequate to provide for the needs of a resettled population as well as affordable. Any new Constitution for BIOT will have to set out the Governor's main responsibilities vis-à-vis the Public Service and will likely require further local laws to define the details of the Governor's responsibilities.

  All overseas territory constitutions give the Governors the power to constitute offices for the territory and also to make appointments to a variety of offices. This would in some cases include the appointment of the Premier or Chief Minister, other Ministers and judicial and public service appointments. The constitutions specify how such decisions and appointments are to be made including the level of consultation required with the local representative body. Article 7 of the BIOT Constitution grants the Commissioner these powers which could be used during any resettlement process without requiring constitutional change.

- **External affairs**. In every overseas territory the Governor retains responsibility for external affairs. Ultimately these responsibilities are in the control of the Secretary of State as the territories have no international legal personality separate from the United Kingdom. In the less inhabited territories including Pitcairn and Ascension and Tristan da Cunha no reference is made to external affairs in the territory constitution and it is therefore presumed that responsibility remains with the Governor. In the St Helena constitution the Governor has the discretion to assign limited responsibilities for external affairs to either a member of the Executive Council or Legislative Council, and is obliged to consult, but not obliged to follow the advice of, the Executive Council on matters relating to external affairs.

- **Defence and policing**. Constitutional responsibility for defence, public order, security and emergency powers are always the responsibility of the Governor of an overseas territory, and in some special circumstances are the responsibility of the commanding officer of any military post. In the less inhabited territories this is not always described in detail as the presumption is that such responsibilities belong to the Governor.

  In the Falkland Islands constitution the Governor must consult the Commander of the British Forces before taking any decision relating to defence or internal security and must act in accordance with the Commander's requests. The Armed Forces Act 2006 extends to the British Overseas Territories and in general UK forces present in an overseas territory are subject to that territory's law however the United Kingdom Forces (Jurisdiction of Colonial Courts) Order 1965 as amended does withdraw jurisdiction from civil courts in several of the territories for certain offences.

  In most territories and certainly in the lesser-populated territories the Governor exercises executive responsibility for internal security and policing and may act against the advice of any local executive or council. Currently in BIOT the Commissioner appoints Police Officers (formerly known as 'peace officers'), drawn from members of the UK military contingent stationed on Diego Garcia, under his powers in the Courts Ordinance 1983. Frequently the same individuals are also immigration and customs officers for the Territory, appointed under the BIOT (Immigration) Order 2004 and the Imports and Exports Control Ordinance 2009 respectively. For the present, there is no reason why this arrangement cannot continue in place. In more substantially inhabited territories there is usually a separate and independent police force acting independently from that of the UK. The Pitcairn model is similar to the present BIOT arrangement with one Police Officer appointed by the Governor, who also functions in practice as an immigration and border officer. In Pitcairn the Police Force is not established as a separate entity and the Police Officer is appointed as other local government officers are under the Local Government Ordinance 2014. In St. Helena, Ascension and Tristan da Cunha an independent Police Force is established with Headquarters in St. Helena. The Police Force is responsible for policing, fire and rescue, immigration and prisons. They are also assigned to carry out their duties on Ascension and Tristan da Cunha. This latter model would be costly to replicate in BIOT and it would be suggested that the simpler, and cheaper BIOT/Pitcairn type model is the optimum short and medium term solution for BIOT.

Governor's Deputies and the Office of Deputy Governor. It is common for territories' constitutions to provide for the appointment of a Governor's deputy during a temporary absence or incapacity of the Governor. There is also a possibility to create a permanent office of Deputy Governor which is a distinct office. In any event, the constitution should include provision for circumstances where the Governor is absent or incapacitated which can include appointing the Deputy Governor or someone else as acting Governor or temporary deputy with specific authorities granted under the appointment.

In some territories the office of Deputy Governor exists, appointed by the Governor with approval of a Secretary of State, directly by Her Majesty by approval or instructions given through a Secretary of State. The Deputy Governor in some cases must be a belonger of the territory. The powers of the Deputy Governor are usually specified in the constitution. Although few of the lesser inhabited territories have this position it is still a possibility for a resettled BIOT in the longer term.

Judiciary. Under Courts Ordinance 1983 a Magistrates' Court and a Supreme Court, acting as a superior court of first instance, are established for BIOT with Magistrates and Judges appointed by the Commissioner. The Supreme Court is made up of a Chief Justice and may sit in the United Kingdom if, in the opinion of the Chief Justice, it is in the interests of justice to do so. The Officer in charge of the Royal Naval/Marine contingent on Diego Garcia is in

practice appointed as a local magistrate and a non-resident Senior Magistrate is also in place. There is a Court of Appeal and as is the case for all overseas territories there is a right of final appeal to the Judicial Committee of the Privy Council. It would seem therefore that a resettled BIOT would not require any immediate changes to the judicial architecture in place, however provision will need to be made to have the courts sit as and when needed. If regulatory change is needed it can be made directly under the Royal prerogative through Orders in Council or, if appropriate through local Ordinance.

One issue which could need attention is the jurisdiction of the various courts, and in particular if a fundamental rights section is introduced to the constitution it would be normal to specify a right of appeal to the Privy Council in cases seeking enforcement of fundamental rights provisions. In practice, as with other less populated territories such as St Helena, Ascension and Tristan da Cunha and Pitcairn where there are no resident legally qualified magistrates, these courts would rarely sit and would be required to visit the islands as and when needed.

No Governor has any judicial function in the overseas territories except in some circumstances to make judicial appointments. The current Commissioner of BIOT is given no powers under the constitution to make such appointments however under the Courts Ordinance 1983 he is responsible for all judicial appointments. In some territories a Judicial Services Commission fulfills this role but it would not be required in BIOT at least in the short and medium term given the likely small caseload.

Law officers. Every British Overseas Territory government has a Law Officer as principal legal advisor usually also filling in the role of Attorney General. In the less populated territories such as Pitcairn, and BIOT, the Law Officer is not resident. Currently in BIOT the Principal Legal Officer, who in practice is resident in the UK, is appointed by the Commissioner and is responsible for all prosecutions under the law. It is likely given the amount of legal reform required for BIOT in the event of a resettlement that a resident Law Officer could be considered, at least in the short-term. In territories where the post exists the Attorney General is an ex officio member of the local executive body and legislature and this could be considered an option for any Island Council established for BIOT. If so, the role would need to be outlined in any new constitution or governance Ordinance for BIOT. In Pitcairn and St Helena, Ascension and Tristan da Cunha the constitutions set out that the Governor appoints the Attorney General upon the approval of the Secretary of State. In both constitutions it is specified that the Attorney General, or those acting under his authority, act independently in the exercise of their functions from the Governor or any other authority or person in the territory and in other territories acts independently in his prosecution functions only.

Civil service and public finance. In most territories the public service is usually defined in the constitution along with areas such as policing and prison services with all such personnel being Officers under the authority of the Governor. In some cases this power is exercisable by the Governor independently, or else upon the instruction from a Secretary of State. It is also open for the Governor to be advised on appointments and dismissals by a local advisory body. In more substantially populated territories the constitution creates a Public Service Commission to advise the Governor, however this may not be appropriate for BIOT in the short and medium term. It would be common for General Orders to be issued by a Governor on the local government regulating the public service and setting out conditions of service. In both Pitcairn and St. Helena, Ascension and Tristan da Cunha the constitutions require the Governor to approve a Code of Management for the public service.

Each overseas territory has its own public funds, rules for raising and spending revenue, audit arrangements. Territories can benefit from funding assistance from the United Kingdom although they are expected to be self-sufficient. Territories can also benefit from access to

EU and other development funding and loans. In the less populated territories responsibility for public finance belongs to the Governor as part of his executive role however the power to raise revenue requires the authority of a legislative act. It is also common for a consolidated fund to be established under the constitution with local legislation outlining how the fund is to be managed. It is suggested that an immediate priority given any resettlement will be to establish the Governor's authority to raise revenues through a local Ordinance and in addition to establish a consolidated fund in order to finance resettlement activities. It is modern practice that all such funds would be subject to an independent audit. In Pitcairn and Ascension and Tristan da Cunha provision is included in their constitutions for an independent audit to be carried out with the Governor required to make appropriate arrangements for an audit, and it is suggested that the same could be considered for any change to BIOT's constitution.

Human rights. In the United Kingdom government's 1999 white paper entitled, '*Partnership for Progress and Prosperity: Britain and the Overseas Territories*' it is stated:

> *Our objective is that those territories which choose to remain British should abide by the same basic standards of human rights, openness and good government that British people expect of their Government. This means that Overseas Territory legislation should comply with the same international obligations to which Britain is subject, such as the European Convention on Human Rights and the UN International Covenant on Civil and Political Rights.*

As BIOT has had no permanent population it has been the position until now that no international human rights treaties which the UK have ratified were considered applicable in BIOT by the UK government.

The Human Rights Act 1998 does not extend to any of the territories and it has therefore been the practice that human rights protection is instead provided for in each territory's law either through Orders in Council or local legislation. In cases where new constitutions for the territories have been drafted since the White Paper in 1999 the United Kingdom government has insisted on inclusion of a fundamental rights chapter with both the European Convention on Human Rights and the UN International Covenant on Civil and Political Rights (ICCPR) given effect. In some territories the fundamental rights chapter goes even further than the UK Human Rights Act 1998 and these two conventions. In all territories the rights and the precise wording used have been agreed after extensive consultations with the local population in order to ensure provisions reflect the wishes of the inhabitants and are also appropriate for each territory's unique circumstances. One example is that there is no right to a trial by jury in Pitcairn's constitution due to the small population (approximately sixty-seven) which would otherwise be impracticable. In all territories with a fundamental rights chapter in the constitution there is an automatic right of any person to apply to the territory Supreme Court (or local equivalent) for enforcement of their rights with the court usually having jurisdiction to award damages.

In some territories an independent Human Rights Commission or Ombudsman or Complaints Commissioner is established under the constitution with the jurisdiction to investigate allegations of human rights abuses by public officers. In Pitcairn and St Helena, Ascension and Tristan da Cunha a Complaints Commissioner's office is established with the Commissioner appointed by the Governor, 'from time to time' allowing the flexibility to appoint a Commissioner as and when needed.

The European Convention on Human Rights including the right to individual petition to the European Court of Human Rights has been extended to all territories apart from Pitcairn, British Antarctic Territory and BIOT. Protocol No.1 and No. 13 to the Convention have also been extended to most territories but not BIOT. Other conventions which have been

extended to some territories include the International Convention on Civil and Political Rights, International Covenant on Economic, Social and Cultural Rights, UN Convention Against Torture, UN Convention on the Elimination of all forms of Racial Discrimination, UN Convention on the Rights of the Child and the UN Convention on the Elimination of Discrimination against Women as well as others. It seems to be the position of the UK government only to extend these conventions to territories that are permanently settled and with the capacity to fulfill the obligations extending them incur.

Should a resettlement go ahead, it is suggested that the priority changes required to the current legal framework of BIOT should include extension of the European Convention of Human Rights including the right to individual petition in addition to the International Convention on Civil and Political Rights. This would ensure that basic human rights are respected and meets the basic obligations the UK has accepted. It would, however, require UK government support to ensure that the requisite implementation and reporting mechanisms are in place relatively early. The other international human rights conventions mentioned above should be considered for extension to BIOT as and when the capacity to fulfill their obligations is in place.

European Union. Although BIOT and most overseas territories are not part of the European Union they have the status of 'overseas countries and territories' for the purposes of Part Four of the Treaty on the Functioning of the EU and are listed as such in Annex II to that treaty. Under a European Council Decision valid from January 1 2014 until the end of 2020, BIOT forms part of an association of overseas countries and territories with the European Union ('Overseas Association Decision'). Although not third countries, the Overseas Countries and Territories (OCTs) do not form part of the single market and must comply with the obligations imposed on third countries in respect of trade, particularly rules of origin, health and plant health standards and safeguard measures. The Overseas Association Decision moves the relationship between the Union and the OCTs to a reciprocal partnership to support the OCTs' sustainable development. The EU Decision establishes an association of the OCTs with the Union (the 'association'), which constitutes a partnership, based on Article 198 of the Treaty on the Functioning of the European Union, to support the OCTs' sustainable development as well as to promote the values and standards of the Union in the wider world.

Importantly article 43 of the EU Decision removes all customs duties for any products imported from the OCTs into the European Union, and Article 44 ensures that no quantitative restrictions apply on goods imported from OCTs. Under Article 45 the OCTs can impose customs duties and/or quantitative restrictions on products imported from the EU. Under Part 4 of the same Decision OCTs are able to avail of European Development funds and technical assistance for their sustainable development as well as for humanitarian or emergency purposes. A total of 364.5 million Euros is allocated for these purposes until the end of 2020 with a further 100 million Euros available for loans through the European Investment Bank (EIB). It will be important for a resettled BIOT to avail of these sources of economic and technical support, particularly in the early stages when infrastructure costs will be high.

4.3 Treaty arrangements between the US and the UK

The British Indian Ocean Territory (Constitution) Order 2004 sets out:

> *9(1) Whereas the Territory was constituted and is set aside to be available for the defence purposes of the Government of the United Kingdom and the Government of the United States of America, no person has the right of abode in the Territory.*

Under the Exchange of Notes between the US government and the United Kingdom, dated 30 December 1966 and subsequently amended by several additional Exchange of Notes some key provisions should be highlighted. In particular:

- the islands shall be available to meet the needs of both governments for defence purposes;
- before either government proceeds to construct or install any substantial construction in the Territory they will seek each other's approval;
- Article 4 of the Supplement dated February 1976 restricts access to Diego Garcia to government officials and military personnel, and subject to immigration rules, civilian contractors. For all other persons 'consultation' between the UK and US governments is required. Article 13 contains a prohibition on commercial fishing, oil or mineral exploitation on Diego Garcia and in the sea and sea-bed over which the UK has sovereignty;
- the Treaty is for an initial period of 50 years, until 2016 when it renews automatically unless either Government gives notice to terminate between December 2014 and December 2016. In practical terms this is also understood to permit either side to propose alterations to the original agreement.

The substance of any changes required to the Treaty between the US and UK governments for the use of BIOT, including Diego Garcia, is not within the scope of this study as it necessarily involves agreement between the two governments. However, it is clear that any resettlement, particularly of Diego Garcia, will require considerable consultation and agreement between the two sides and will likely require an amendment to the current Treaty arrangements.

4.4 Environmental protection laws and conventions

The United Kingdom Government White Paper from 2012 on the British Overseas Territories stresses the importance given by the government to the protection of the environment in the overseas territories. The White Paper gives BIOT as a Case Study:

> *The islands, reef systems, biodiversity and waters of BIOT are among the richest on the planet, containing about half of all the reefs of this ocean which remain in good condition. Established on 1 April 2010, the Marine Protected Area – where commercial fishing is prohibited- is the largest such marine reserve in the world.*

On 26 September 2001 the BIOT Environment Charter was signed by the UK and BIOT Governments. The Charter sets out the BIOT government's vision for protecting the environment of BIOT. Although the BIOT constitution expressly states that the islands are to be used for defence purposes it is accepted that the islands have a special environment that requires protection. Any resettlement of BIOT will have to take into account the need to balance sustainable resettlement with adequate protection for the environment.

One general comment to make is that in BIOT there is currently no planning and development legislation in place and therefore no strict legal requirement to undertake Environmental Impact Assessments (EIAs) before permitting major development proposals. A resettled BIOT would also require a strategic development planning process to identify respective areas for building and conservation and prevent uncontrolled development from spreading across the most valuable landscapes, coastlines and habitats. However, since all land is owned by the Crown this is not seen to be a major problem.

4.4.1 Marine protection and fisheries

On the 1 April 2010 the Commissioner for BIOT, on behalf of Her Majesty and acting through the Secretary of State, issued a Proclamation establishing a Marine Protected Area (MPA) within the Environment (Protection and Preservation) Zone that had been proclaimed on September 17 2003. This zone extends seawards from the outer limit of the 3 nautical mile territorial sea to 200 nautical miles. The islands and their territorial sea are excluded from the MPA. The Proclamation states that legislation and regulations detailing how the MPA will affect fishing and other activities within the MPA will be passed at a later stage. No such legislation has been passed until now and it is likely to vary depending on whether resettlement goes ahead.

The Fisheries (Conservation and Management) Ordinance 2007 and related Statutory Instrument from 2007 regulate all fishing activities for BIOT until such time as implementing legislation for the MPA is passed.

Under section 7 of the 2007 Ordinance fishing is prohibited in the mentioned waters without a license from the Director of Fisheries. Licenses used to be issued for both pelagic and inshore fishing until the last one expired on 1 November 2010. Section 7 of the Ordinance allows for some limited fishing for those legally present on the territory with the main condition being that the fish is for personal consumption within 3 days. These provisions would allow any returning Chagossians to undertake limited fishing for personal consumption but would not allow basic artisanal fishing. In the event of resettlement it would be a priority to engage with the Chagossians to agree on how best to amend this legislation. It should be noted that under section 11 (2) of the Ordinance the Director of Fisheries can impose different requirements for issuance of licenses to fishing boats. It is possible therefore that some limited permits could be given to Chagossians to carry out artisanal fishing until such time as more substantive changes to the legislation could be agreed. The existing Statutory Instrument from 2007 implementing the Ordinance and which was drafted to cover the existing commercial fishery sets out quite stringent criteria for fishing boats to apply for a license including insurance, various certificates, safety equipment which would be difficult for a resettled artisanal fishing to comply with. It is therefore likely that the Statutory Instrument, at the very least, would require amendment to allow the issuance of licenses in these cases.

The United Kingdom has also proclaimed a 200-mile BIOT Fisheries Conservation and Management Zone (FCMZ) on October 1, 1991, and a BIOT Environment Protection and Preservation Zone (EPPZ) on September 17, 2003, with geographical coordinates notified to the UN Secretariat under UNCLOS Article 75(2). The FCMZ has been implemented by the various Fisheries Ordinances, the current of which has been considered above. No domestic legislation has been issued to enforce or regulate the EPPZ so this would not have any direct impact on a resettled population.

4.4.2 Nature reserve and wildlife protection

In addition to the MPA, there are other legal protections in place to protect and preserve the wildlife on BIOT (*British Indian Ocean Territory, the Protection and Preservation of Wildlife Ordinance, 1970; The Strict Nature Reserve Regulations, 1998; Statutory Instrument No. 4 of 1998*). Under this legislation the islands (and their territorial waters) specified in the Schedule are declared to be Strict Nature Reserves. Unless permission is granted no person can enter, traverse, camp in or reside, engage in hunting or fishing or conduct any other activity including agriculture in the areas specified.

The islands specified are: In the Great Chagos Bank (a) Three Brothers and Resurgent Island (b) Danger Island (c) Cow Island (d) Nelson Island. In Peros Banhos Atoll, all the islands to the east of a line drawn between the easternmost point of land on Moresby Island and the easternmost point of land on Fouquet Island. Any resettlement to these islands

would therefore require either amendment to this legislation or the granting of permits to those returning.

4.4.3 Diego Garcia Lagoon

The Diego Garcia lagoon (including the military port and anchorages), part of the territorial sea and the eastern land of the atoll is designated as a wetland of international importance under the 1971 Ramsar Convention (ratified by the UK with effect from 5 May 1976 and extended to the BIOT on 8 September 1998). The application of the Convention to Diego Garcia excludes "the area set aside for military uses as a US naval support facility". Under Article 3 of the Convention the United Kingdom commits to formulating and implementing their planning so as to promote the conservation of the wetlands, and as far as possible the wise use of wetlands in their territory. The use of this area for a resettled population is therefore possible but with the commitment to ensure that damage to the environment is limited. Currently, recreational and sport fishing are listed as one of the uses of this designated area.

4.4.4 International treaties

BIOT is also subject to further levels of internationally binding legal protection with regards to the environment. Those Conventions are listed below and will need to be taken into account in any new governance framework for BIOT.

Table 4.1: BIOT environmental conventions

Environmental conventions applying to BIOT	Date of extension of ratification
Convention on the prevention of marine pollution by dumping of wastes and other matters 1972	17.11.1975
International convention on international trade in endangered species of wild fauna and flora 1973	2.8.1976
Amendments to articles xi, xiv(4)(a) and xv(1)(a) of the convention on the prevention of marine pollution by dumping of wastes and other matter of 29.12.1972 21.3.1980	21.3.1980
Amendments to articles xi, xiv(4)(a) and xv(1)(a) of the convention on the prevention of marine pollution by dumping of wastes and other matter of 29.12.1972	21.3.1980
Amendments to articles i and ii of the convention on the prevention of marine pollution by dumping of wastes and other matter of 29.12.1972	9.3.1979
Convention on the conservation of migratory species of wild animals 1985	23.7.1985
Vienna convention for the protection of the ozone layer 1985	15.5.1987
Amendments to articles 6 and 7 of the convention on wetlands of international importance (of 2.2.1971) especially as waterfowl habitat 1987	8.9.1998
Amendments to articles xi, xiv(4)(a) and xv(1)(a) of the convention on the prevention of marine pollution by dumping of wastes and other matter of 29.12.1972	21.3.1980
Montreal protocol on substances that deplete the ozone layer 1987	16.12.1988
Protocol to amend the international convention on civil liability for oil	20.2.1998

Environmental conventions applying to BIOT	Date of extension of ratification
pollution damage of 29.11.1969	
Protocol to amend the international convention on the establishment of an international fund for compensation for oil pollution damage of 18.12.1971	20.2.1998
Agreement for the implementation of the provisions of the united nations convention on the law of the sea of 10 december 1982 relating to the conservation and management of straddling fish stocks and highly migratory fish stocks	13.12.1999
Convention on the prevention of marine pollution by dumping of wastes and other matters	17.11.1975

4.5 Conclusions and implications for resettlement

There are no fundamental legal obstacles that would prevent a resettlement of BIOT to go ahead. The legal and constitutional framework will however require significant amendment in order to facilitate a resettlement and this will require a comprehensive consultation process with the Chagossians and other interested parties.

It is suggested that the following areas should be considered a priority in advance of and during the initial stages of any resettlement:

- The decision needs to be taken as to whether any new constitution, interim or permanent, for BIOT would be based solely upon Her Majesty's prerogative powers or on a United Kingdom statute based primarily on what level of oversight the UK Parliament may require.
- The possibility of putting an interim constitutional framework in place until the first phases of resettlement have been successful should be considered. The question of how best to ensure the consultative process for this can be as inclusive and fair as possible needs also to be dealt with.
- The constitutional framework and immigration ordinances require immediate amendment to allow Chagossians to resettle and live on designated areas of BIOT. In the longer term issues relating to nationality would also need to be resolved.
- A process to allocate use of land by the BIOT government to returning Chagossians should be put in place as soon as possible.
- The decision needs to be taken on whether to establish the position of Governor or maintain the existing position of Commissioner as well as to decide what direct powers the position will have as well as where the title holder will be based.
- A resident civil service system will need to be established to assist in facilitating the resettlement including provision of basic medical, police and other vital services. It is likely that courts will also be required to function on occasions as-required in the short-term and provision should be made for this.
- A temporary consultative body for Chagossians and other interested parties needs to be put in place, perhaps based on a conference of representatives, until a more permanent consultative structure can be agreed and established by constitution or local Ordinance.

- Given the amount of legal amendments required during the initial phases of any resettlement a resident Law Officer could be considered, at least in the short-term.

- The Commissioner's/Governor's authority to raise revenues through a local Ordinance needs to be established in addition to a consolidated fund in order to finance resettlement activities.

- It is advised that at the early stages of any resettlement the European Convention of Human Rights including the right to individual petition in addition to the International Convention on Civil and Political Rights be extended to BIOT. The UK government would need to ensure the requisite support is in place to ensure that implementation and reporting requirements for these mechanisms are in place relatively quickly.

- As early as possible a procedure for accessing European Development Funds for BIOT needs to be put in place.

- Amendment is required to the current treaty arrangements between the US and the UK for BIOT in order to allow for resettlement.

- The Fisheries (Conservation and Management) Ordinance 2007 and related Statutory Instrument from 2007 require amendment to allow for at least artisanal fishing for a resettling population.

The process of installing a new constitutional and governance framework for BIOT will necessarily take time and will depend on the pace of any resettlement and the needs of the returning populace balanced with consideration for environmental concerns and the importance of BIOT for defence purposes. The following issues will need to be dealt with in the medium to long term:

- If not agreed initially a permanent constitution needs to be agreed. This should include a system of local governance where the powers of the Governor and local council are set out, as well as the relationship between one and the other.

- A new constitution would need to include a fundamental rights chapter based on consultations with the local population in order to ensure provisions reflect the wishes of the inhabitants and are also appropriate for the territory's unique circumstances. Other international human rights conventions mentioned previously should be considered for eventual extension to BIOT as and when the capacity to fulfill their obligations is in place.

- It is suggested that an Ombudsman or Complaints Commissioner could be established, albeit with the option to appoint someone only when needed, with the jurisdiction to investigate allegations of human rights abuses by public officers.

- A resident judicial system may eventually be considered although it is more likely that only a local resident Magistrate would be needed along with occasional sittings of other courts. If a fundamental rights section is introduced to the constitution it would be normal to specify a right of appeal to the Privy Council in cases seeking enforcement of fundamental rights provisions.

- It is likely that any provisional arrangements for establishment of a civil service will need to be made permanent and included in local Ordinances.

- The 2001 BIOT Environment Charter signed by the UK and BIOT Governments will require amendment to reflect the changes brought by a resettled population.

- The legislation and regulations detailing how the MPA will affect fishing and other activities within the MPA will vary depending on where resettlement goes ahead.

- The Fisheries (Conservation and Management) Ordinance 2007 and related Statutory Instrument from 2007 regulating all fishing activities for BIOT will require amendment to reflect the new situation again balancing the needs of the local population with environmental and defence concerns.

5 ENVIRONMENTAL ANALYSIS

5.1 Introduction and overview

The continued physical existence of Chagos depends on the health of its underlying coral reefs, upon which the islands have formed. Diminished reef health, coupled with unfavourable shoreline changes, whatever the causes, has a direct bearing for any human populations inhabiting BIOT. On Diego Garcia, increased coastal vulnerability has led to the need for costly artificial shoreline defence – currently exceeding $10 million per year[5].

This high level of interdependence calls for joined-up thinking about BIOT's coral islands and about the risks and benefits associated with alternative re-settlement options. Integrated thinking, combining socio-political, economic, legal and environmental perspectives, is therefore an overarching thread in KPMG's evaluation.

Environmental risks associated with re-settlement of Chagos, should it occur, encapsulate two different concepts:

- **risks to resettlement from the environment** (e.g. from coral mortality, beach erosion, climate change impacts, overtopping of islands or seawater ingress into soils) – whether these physical challenges result from natural factors, human activities, or both; and
- **risks to the environment from resettlement** (e.g. decline in coral health or biodiversity from construction/dredging, or over-fishing).

5.2 Assessment of key environmental issues

5.2.1 Coral reef health

The Chagos islands are accumulations of sand and gravel originating from eroded coral, rubble (and coralline algae). Active coral reef growth (accretion) provides the raw materials[6]; normally erosion is balanced by accretion. However, if accretion rates fall, due to stress on coral reefs, island robustness can diminish. This increases vulnerability to seawater breaching and many other undesirable consequences. Maintained reef health is therefore critical for island longevity and the prospects of any resettled population in Chagos.

Human-related factors reducing coral cover (directly or indirectly) and undermining reef health, and thus their normal ability to accrete, include the following;

- **Elevated nutrient levels**: for example, from sewage, leading to algal blooms, low oxygen and other undesirable knock-on effects (e.g. fish decline).
- **Limited coastal planning**: for example, dredging, infilling and siting of infrastructures in areas that impair key natural processes. These can alter their dynamics and often leads to unwanted erosion and/or sedimentation – the latter being particularly harmful to reefs.

[5] A US investment of over $30 million during 2014/15 to protect the shoreline from gradual erosion.' (Written Ministerial Statement from FCO, 6th March 2014).

[6] Overtopping (and associated flooding) allows a fresh layer of sediment to be added to island surfaces, thereby increasing land levels (Kench et al., 2006).

- **Coral bleaching**[7]: the severe 1998 El Niño Southern Oscillation (ENSO) event leading to seawater warming and massive reef mortality in Chagos (to 10-15 metres depth on northern atolls, to above 40-metre depth in Diego Garcia) and in other parts of the Indian Ocean[8].

- **Coral diseases**: currently at the low end of the global spectrum in Chagos, but possibly increasing[9] and new diseases (e.g. 'white syndrome') may be emerging and responsible for some mortality of large table *Acropora* corals observed (2014).

- **Increased ocean acidification**[10]: following uptake of atmospheric CO2 in the oceans; it causes reduced calcification of calcifying organisms such as reef-building corals – a problem that is increasing globally.[11]

Hence, any resettlement in Chagos should be done with minimal (physical, chemical and biological) interference to its coral reefs and the island/sea interface – for example by jetties and clearance of coconut palms or accumulation of contaminants. This is necessary insurance premium to help ensure maintenance of reef health, sediment production[12] and island resilience.

5.2.2 Resettlement and environmental sustainability

Overall, the environment in Chagos is still relatively pristine although, as noted below, diminished coral cover and health is evident in some areas (Annex 5.1). If resettlement proceeds, many factors will determine if reefs remain in relatively good condition, or degrade to the poor or heavily impacted state that now characterises most inhabited coral reef areas of the Indian Ocean[13]. The choice of resettlement option (Section 3.4), the number of returning Chagossians and activities will strongly influence future environmental condition. The initial population is likely to increase, but it could fall[14]. Hence, population levels and

[7] Coral die-back/bleaching events may temporarily generate higher than normal rates of sediment supply and could contribute to reef growth. But it will probably also lead to longer-term changes in reef-profile or morphology and reduced reef robustness. In the Caribbean, the virtual loss of all reef-growth reflects the death of most corals. This may have led to greater rates of island erosion and inundation than in the Pacific, although uncertainties remain (Note based on e-mail communications from Mark Spalding.)

[8] Chagos experienced marked changes in coral cover between 1978 and 2014, with notably low levels following the 1998 lethal and widespread bleaching event; reasonable recovery was evident up to 2012 (Annex 5.1). To place Chagos in regional context, the archipelago provides an estimated 25% of reefs in the 'Low Threat' category within the Indian Ocean; additionally, these are by far the largest contiguous reef tracts in this condition (personal communications from M. Spalding (2011). However, some consider this misleading, as many reef areas in Chagos are not currently pristine (J. Turner/CCT, pers. comm.).

[9] Overall coral disease prevalence 5.2% in 2006, and initial analysis of 2014 data suggests no significant difference (J. Turner, pers. comm). However, there is much uncertainty and variability.

[10] An overall decrease of pH by 0.1 since the pre-industrial era, and steady decrease of 0.02 pH units per decade over the last 30 years, with the rate of acidification projected to increase in the coming decades.

[11] For atmospheric CO2 concentrations of 450–500 ppm (projected to occur in 2030–2050), severely diminished reef building processes, with erosion exceeding calcification, is predicted.

[12] Small islands are very vulnerable, although conditions highly variable (Forbes et al., 2013). However, even modest living is difficult without big infrastructures – ports etc (which already exist in Diego Garcia), but these are environmentally invasive (J. Turner/CCT, pers. comm).

[13] Coral reefs of most UK Overseas Territories have been subject to substantial damage from overuse or extraction of resources, a situation now common around the world (Sheppard, 2013). Despite uncertainties, the following is also noted in the FCO's (2012) White Paper on the Overseas Territories: The Intergovernmental Panel on Climate Change has identified the Territories as amongst the most vulnerable' and 'virtually certain to experience the most severe impacts' of climate change. This will mean sea level rise; coral bleaching and changes in weather patterns, as well as other threats including land-use change, invasive species and threats to habitats from unsustainable development.

[14] The former would add to environmental pressures and resource use. Voluntary departure, evacuation following breaching by the sea, or even natural population decline would ease environmental pressures. But there would

environmental pressures over the 20-year time span addressed in this study will probably not be indicative of future trends. Impacts often build progressively following population growth, as seen across the Indian Ocean.

If environmental sustainability[15] and the MPA's integrity are to be assured, a cap may be needed on the total number of BIOT islands (and perhaps) atolls available for resettlement[16]. Otherwise, progressive 'island creep' and unsustainable development following resettlement could easily happen[17]. Issues surrounding sustainability are addressed further in sections 5.2.4 and 5.2.5.

5.2.3 Sea level rise, coastal erosion and overtopping

Measured globally averaged sea level rise, and generally accepted figures, are: 1.7 mm/yr (1901 – 2010), 2.0 mm/yr (1971 – 2010) and 3.2 mm/yr (1993 – 2010)[18] [19]. Projected global average changes by the Intergovernmental Panel on Climate Change (IPCC) are 6.5 mm/yr (2013-2050) and rising to 7.4 mm/yr (2013-2100). For Diego Garcia, measured tidal gauge data (2003-2014) indicate sea level rise of 6.4 mm/yr, but with much variability in the data [20]and interpretations vary. Using radar altimetry, measured sea level rise for different atolls in Chagos (1993-2014) indicates an increase of 3.36 mm/yr (Diego Garcia) and 3.2 mm/yr (Peros Banhos and Salomon)[21]. Since projected sea level changes for Chagos carry

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be economic implications as a result in substantial outlay of capital costs for infrastructures and other resettlement facilities having reduced demand.

[15] 'Sustainability' is a misleading concept. In many parts of the Indian Ocean resource abundance diminished long ago. If it persists in this condition, it might be considered 'sustainable' – but only because the initial baseline was so poor. For these situations, 'persistence' is probably a better term. In Chagos, environmental health is good overall, i.e. the benchmark is set high; measured departures from this following any resettlement, by environmental monitoring, will serve as a gauge of sustainability.

[16] Consideration of a cap may not be necessary immediately, but certainly soon after any initial resettlement.

[17] This is an expected environmental outcome, not a position or judgement on whether or not resettlement should proceed. Additionally, if resettlement occurs, it would probably be very difficult in practice to prevent inhabitation of additional islands in the future, if islands became over-populated and/or sustainability became compromised following initial resettlement. Population expansion across islands and atolls would inevitably add to progressive environmental pressures in BIOT and likely compromise the integrity of the MPA.

[18] http://www.ipcc.ch/report/ar5/wg1/

[19] However, a recent paper indicates no evidence of acceleration in rise of global mean sea level in the twentieth century (Gregory et al., 2013).

[20] Tidal gauge data measures changes in sea level height and includes any vertical land movements. The mean is 6.4526 ± 5.0499 SE mm/ yr; a qualitative rise is evident, but statistically it is not significant (Dunne, 2014); the graph has been further examined mathematically (M. Keeling, pers. comm.), who noted: that without the raw data a definite answer is not possible, but given the huge amount of noise throughout the time-series it looks as if the changes are not significant; maximum tidal height in any year shows no indication of changing over time (Dunne, 2014).

[21] Measured radar altimetry data (which records sea level height and change only – not any vertical land movements), Chagos: 1993 – 2014 (Peros Banhos & Salomon) - 3.2 mm yr-1 (UCSLRG sea-level trend map (2014 release 4; Dunne, 2014); 1993 – 2014 (Peros Banhos & Salomon) - 3.24 mm yr-1 (http://www.star.nesdis.noaa.gov/sod/lsa/SeaLevelRise/LSA_SLR_maps.php; Dunne, 2014); 1993 – 2014 (Diego Garcia) - 3.36 mm yr-1 (UCSLRG sea-level trend map (2014 release 4; Dunne, 2014); 1993 – 2014 (Diego Garcia) - 3.74 mm yr-1 (http://www.star.nesdis.noaa.gov/sod/lsa/SeaLevelRise/LSA_SLR_maps.php; Dunne, 2014). Data do not include correction for glacial isostatic adjustment (GIA), which is the generally accepted norm, which would between +0.2 - +0.5 mm / yr.

uncertainty, it is probably safest to adopt the above global estimates of 6.5 to 7.4 mm/yr (2013-2100); a recent study projects a sea level rise of for Diego Garcia in the range of 1.2 to 5.3 mm/yr (< 65 cm 2010-2090, i.e. < 7.6 mm/yr if the upper limit is augmented to account for accelerated drawdown of ice sheets[22]). Annexes 5.2a and b provide additional details of sea level rise and related environmental issues.

An important factor is whether coral growth can keep up with sea level rise in BIOT. Available coral reef growth (accretion) data from elsewhere indicate a range of 0.60 to 7.89 mm/yr, averaging 3.54 mm/yr. Although these figures carry uncertainties[23], particularly regarding their applicability to Chagos and implications for resettlement, they are of much concern. As noted, a key issue is the extent to which reef growth can keep pace with erosion and sea level rise, under conditions of increasing acidity.

Coastal erosion[24] and overtopping (breaching of islands by sea water) are evident in BIOT. Details are known best for Diego Garcia where overtopping has occurred in a number of places[25]. Whether erosion and overtopping have increased, especially on the outer islands, remains equivocal[26]. What is also poorly understood (but complex) is the extent to which these disturbances reflect natural processes, the influence of coastal infilling for development infrastructures (Diego Garcia) or climate/regional scale impacts[27]. Whatever the causes, erosion and overtopping are a reality for BIOT, and could become more problematic in the future.[28] The extent to which the islands will remain robust against these and other disturbances is unclear[29]. The extent and the likelihood of flooding events would not only effect resettlement in terms of living arrangements but also threatens to contaminate the freshwater lenses and damage any potential agricultural output. Concerns about the vulnerability of BIOT islands are also evident in the questionnaire responses described in section 3. In view of the vulnerability and uncertainty about the future of BIOT islands and resettlement prospects (especially on the outer islands), the precautionary principle would

[22] Forbes, D.L. et al., 2013. Physical basis of coastal adaptation on tropical small islands. 8, 327–344. This study, based on projections from the IPCC (2007), also shows that vertical crustal motion is low for Diego Garcia.

[23] Uncertainties about reef accretion may be summarised as 1) these are (pre-1999), not recent estimates, and rates may become lower as ocean acidification and other reef disturbances increase; 2) the data are not from Chagos, and 3) reef accretion rates for Chagos have not yet (Oct.2014) been measured.

[24] Changing shorelines, changing island shapes, growth of some islands and diminution of others are evidence of the dynamic nature of islands and changes in erosion.

[25] Problems have occurred in a number of places – in addition to western parts, where construction of artificial defences is on-going, to counteract erosion and protect military facilities. For example, on the eastern arm of Diego Garcia, erosion has broken through to the century old track in many places; shoreline flooding is evident in several parts of Diego Garcia. While changes in erosion and accretion of white sand on any island occur seasonally, and over longer time scales, erosion of dark, organically enriched soils is of greater concern. This commonly supports mature hardwoods and palm trees.

[26] As noted, marked shoreline changes in Diego Garcia are evident from the study by S. Purkis (2014), but on this island no net increase in erosion is evident

[27] As noted later in the report, a study of coastal erosion and shoreline changes in Diego Garcia has been recently completed (Purkis, 2014). Preliminary findings indicate very complex coastline changes over the last half-century. Some coastal areas on Diego Garcia appear to have sediment accumulation while others have eroded. Interestingly, the net coastal change is close to zero; island area gained by shoreline extension is cancelled elsewhere by retreat – excluding modified areas (i.e. port, airport). Coastal change is more variable in areas associated with infrastructures, including coastal armament (against sea level rise), and increased erosion is also evident in nearby areas. It is not yet clear if there are differences in between Diego Garcia, Ile du Coin and Boddam, although patterns for these islands may well also be very complex.

[28] Erosion and overtopping could increase – if not from sea level rise and other 'external' events, then from reduced reef health, and many other factors; for example, island profiles (Annex 5. 2). influence overtopping risk more than average island heights. Section 5.3 considers the relative robustness of different islands and resettlement options to climatic impacts, erosion and other shore disturbances.

[29] Global change has many perspectives to consider. While the Pacific Islands of Kiribati have evacuation plan, a recent review (Webb & Kench, 2010) of 27 Pacific Islands over a 20 to 61-yr period when sea level rise 2 mm indicated: 43% remained stable, 43% increased in areas and 14% decreased in area. On the other hand, there is good evidence coral reef health is in general decline, weakening their capacity to absorb the escalating impacts.

advocate provision for artificial shore defences (coastal armament) on any islands resettled[30], plus an evacuation plan.

5.2.4 Environmental carrying capacity of potential resettlement locations

Population size supportable on the potential island options (initially Diego Garcia, Ile du Coin and Boddam) depends on many issues addressed throughout section 5 and many other assumptions. Particularly critical are the following:

- the resettlement option(s) adopted along with human activities;
- the degree to which fish and other natural resources (e.g. sand/coral for building) are extracted from the islands: imports reduce the local ecological footprint and increase carrying capacity, while self-sufficiency has the opposite effect;
- inhabitation of an island by several hundred individuals (outer islands) or a few thousand individuals (Diego Garcia) might be theoretically possible, but the costs will be highly variable and potentially high – not only environmentally (and economically), but also to life quality for any resettled population;
- acceptable thresholds for selected environmental monitoring parameters (i.e. to understand if/when a problem has emerged) have yet to be determined and agreed[31];
- carrying capacity on any island is not fixed, but variable and highly complex[32]; and
- related to the above, many environmental and logistic problems can be overcome with sufficient technical and financial resources (as witnessed by artificial shore defences on Diego Garcia, protecting the military facility, and costing many millions of US dollars)[33]

Recognising these and other uncertainties, possible carrying capacity estimates for the three likely island and respective resettlement options are summarised in the table below. For Diego Garcia, several thousand probably could be supported in the way done by the military facility, namely with all food and facilities flown or shipped in, with resupply every few days. For the outer islands, the lower KPMG estimate (50 individuals) is fairly similar to the average carrying capacity figures given by respondents to the questionnaire for basic/subsistence (65-79 individuals) and modern lifestyle (60-63 individuals). These figures are also close to the low level of human presence (40 individuals) known to, reduced fish size, calcifying substrates, and coral diversity in a predictable manner (Annex 5.4). The higher figures in carrying capacity estimates reflect the fact that some or a moderate level of environmental injury would be inevitable[34]. It is also evident that respondents thought that islands have a larger capacity to carry a modern lifestyle than subsistence. This may partly

[30] It is wiser to earmark costs for shore defence, even if this later proves to be unnecessary, than not to include costs but later to find increasing impact on resettlement from coastal erosion and overtopping.

[31] As noted elsewhere, as an interim measure a significant/unexpected change from ambient environmental conditions should trigger management concern and possible remedial action.

[32] Variability is due to changes in natural processes; precautionary principle therefore advocates conservative estimate; however, as noted populations could expand and the number of islands colonised potentially increase – as capping of number of inhabited islands difficult to implement.

[33] Similarly, solid and other waste is a big issue; some in Diego Garcia is recycled/dealt with on-site, but much removed at a high cost.

[34] On Diego Garcia, estimated carry capacity is higher than for the outer islands, not only because the island is bigger, but also because substantial impacts have already occurred – such that it is now far from pristine. Arguably, the environmental benchmark/baseline is set relatively lower, in reflection of its degraded condition. On the other hand, limiting any additional population in Diego Garcia to only a few hundred will hinder environmental recovery less than an additional population of a thousand or more.

reflect the fact that subsistence lifestyle would likely call for greater self-sufficiency than modern lifestyle. As noted, this increases the local ecological footprint, and hence lower carrying capacity might be expected.

Table 5.1: Estimated carrying capacity (maximum population supportable) and previous population densities for Diego Garcia, Ile du Coin and Boddam

Island	KPMG estimates (mainly based on environmental issues)	Estimated previous population sizes	*Estimated carrying capacity (numbers of people) from environmental questionnaire			
			Basic/subsistence lifestyle (range and average)		Modern lifestyle (range and average)	
Diego Garcia	1,000-2,000	200-619	0-3,000	363	0-5,000	1,427
Ile du Coin	50-250	60-346	0-200	65	0-400	60
Boddam	50-250	89-219	0-200	79	0-300	63

**Less than half of the 51 respondents provided data for this question (see Annex 3.yy) (ased on a dataset with 51 responses)*

Estimates of the carrying capacity of the three islands identified for possible resettlement are vital when deciding the size of any possible resettlement and any restrictions that might be placed on any expansion of resettlement. Though the numbers of people that would resettle if given the opportunity are uncertain, it is clear that the islands have a capacity threshold which needs to be taken into account when deciding on the scale and type of resettlement.

5.2.5 Acceptable levels of fishing

Reef fish and sea cucumbers. Levels of fishing that can be supported in Chagos depend primarily on resource biomass levels (Annex 5.5); targeted reef fish biomass is extremely high, especially on the outer atolls:

- Peros Banhos: more than 7,000 kg/ha;
- Salomon: 3,000 kg/ha; and
- Diego Garcia: 1,250 kg/ha.

Appropriate fishing levels also depend on the objective in question. For example, if the objective is to maintain ecosystem processes sufficiently in order to avoid collapse, then fairly heavy fishing might be appropriate[35]. Work in the Indian Ocean suggests a guide is to keep fishing at a level such that biomass remains at ≥300-500 kg/ha. However, if the goal is to maintain higher trophic level and large species in the assemblage, then very little or no fishing is preferable[36][37] (see also Annex 5.5). The recreational fishery around Diego Garcia, whose estimated sustainable yield was considered to be 4-5 t kilometres-2 yr-1, declined

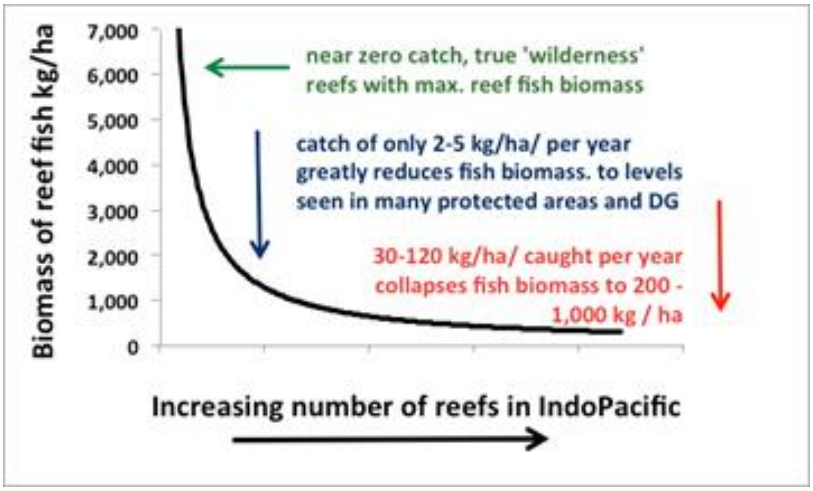
[35] N. Graham (pers. comm.).

[36] It is worth noting that overfished fisheries can take 60-80 y to recover; Chagos reef fish populations may only now be nearing recovery from previously BIOT colonization (T. McLanahan, in review/press).

[37] N. Graham also notes '.., very little fishing can deplete the biomass of large upper trophic level species, and thus alter the foodweb. These groups only appear to be protected in large remote unfished locations such as northern Chagos. But you can fish a reef a fair bit harder and still maintain most processes – it just becomes a less complete system.'

under relatively light fishing[38]. Some recent assessments consider that the fishing level 0.1 t/kilometres2/yr-1 for the comparable commercial inshore fishery might also be applicable to Diego Garcia's recreational fishery.

Figure 5.1 Schematic of fishing effects on reef fish abundance



Estimated potential/sustainable yields for commercial bank-reef fisheries are available for inshore waters of BIOT, by area and depth, for various sectors. These include Peros Banhos and Salomon, but not Diego Garcia. Values range from 0.1 t/kilometres²/yr to 1.375 t/kilometres²/yr. These authors have suggested a conservative estimate of 0.1 t/kilometres²/yr be considered appropriate for BIOT. Even this lower estimate[39], equivalent to 10,000 kg/ha/yr, is a very high quantity. Potential yields are not necessarily sustainable for long, particularly under prolonged and heavy fishing.

Potential/sustainable fishery yields above are broad metrics for mixed species, whereas individual species may be more or less vulnerable based on life histories. A fishing 'vulnerability' score is available for most species[40] and will be valuable in the event of resettlement and for more precise determination of catch quotas. Although desirable, these are seldom straightforward for the reasons noted. If they are set, on-going monitoring would be critical, to determine if or when thresholds are crossed, so that fishing effort can be eased. Otherwise, population decline would be likely or inevitable.

Sea cucumbers should probably be targeted only very lightly, or preferably not at all, in view of their proneness to unsustainable harvesting in Chagos (Annex 5.6) and elsewhere and also because of their major role in maintaining coral reef and ecosystem health[41].

Reef sharks. Acceptable take for a 'sustainable' shark fishery is essentially zero, unless numbers increase substantially from present depletion levels, which is likely to take 20+ years, given shark behaviour and fecundity (see Annex 5.6).

Tuna and pelagic fish. Determining safe or sustainable capture levels of tuna for Chagos is problematic, especially given their migratory nature, recent declines in catch per effort and marked variation in BIOT catches (e.g. 685 t in 2006 and 732,051 t in 1993-4). Until

[38] Shark abundance has also declined in Chagos.

[39] 0.1 t/km2 = 100 kg/km2 = 10,000 kg/ha

[40] www.fishbase.org

[41] A sustainable catch limit is not possible to calculate. Sea cucumber densities in Chagos are increasing again in that numerous small individuals are now evident in many shallow areas. No 'sustainable catch' limit is even possible given that gleaning often removes all from the areas being fished.

populations are known to be stable in Chagos waters, no tuna fishing may be the only precautionary, long term or sustainable option. Issues surrounding sustainability, conservation and exploitation partnerships are examined further in Annex 5.7).

Many governance aspects and disparities will be important to consider in the event of resettlement. For example, the only fishing currently permitted in Chagos without license is for personal consumption within three days[42]. To FAO and others, this technically does not constitute 'subsistence' fishing, which has a specific meaning[43] – as does artisanal fishing[44]. A balance would clearly need to be struck between perceived appropriateness of a particular fishing activity and risk of over-fishing. This would be particularly important for immediate-needs fishing ('fish for food'), and particularly for any exploitation for economic purposes ('fish for finance').

As noted, Diego Garcia lies outside the MPA, and hence is not subject to the same fishery restrictions and other issues that apply to the outer atolls. This, combined with many other environmental, technical and socio-economic factors, would make Diego Garcia the most realistic island option in the event of resettlement. Given recent fishing history on this island, however, fishery regulations would need to be strengthened, perhaps by including one or more small No-Take Reserves, to facilitate replenishment of fish populations[45].

Many governance aspects and disparities will be important to consider in the event of resettlement. For example, the only fishing currently permitted in Chagos without license is for personal consumption within three days[46]. To FAO and others, this technically does not constitute 'subsistence' fishing, which has a specific meaning[47] – as does artisanal fishing[48].

[42] R. Dunne (pers. comm.) believes that BIOT Ordnance No. 5 (2007), allowing fishing for only 3 days, may be overly restrictive; 'artisanal' or 'subsistence' fishing as defined by FAO (see separate footnotes) is not permitted in Chagos. He feels that any increase in inshore fishing (by resident Chagossians), through changes in the law, could be partly offset by stopping all recreational fishing, and limiting fishing to subsistence, licensed and sustainable fishing by Chagossians on the east of DG. Recreation involving fishing could perhaps be replaced by tourist/leisure activities (Chagossian-US arrangement) for base personnel as noted above. Mr Dunne also considers that limited pelagic fishing should not be problematic.

[43] A fishery where the fish caught are shared and consumed directly by the families and kin of the fishers rather than being bought by intermediaries and sold at the next larger market. Pure subsistence fisheries are rare as part of the products are often sold or exchanged for other goods or services (http://www.fao.org/fishery/topic/12306/en).

[44] Typically traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amount of capital, relatively small fishing vessels, making short fishing trips, close to shore, mainly for local consumption. In practice, definition varies between countries, e.g. from hand-collection on the beach or a one-person canoe in poor developing countries, to more than 20 m. trawlers, seiners, or long-liners over 20m in developed countries. Artisanal fisheries can be subsistence or commercial fisheries, providing for local consumption or export. Sometimes referred to as small-scale fisheries In general, though by no means always, using relatively low level technology. Artisanal and industrial fisheries frequently target the same resources that may give rise to conflict (http://www.fao.org/fishery/topic/12306/en).

[45] This would likely be beneficial, and good insurance, particularly given the regional variations in fish abundance in Chagos and difficulties in setting clear-cut catch quotas. To work properly, any reserve as to be respected. A comprehensive review of fisheries in the context of the Chagos No-Take MPA has recently been produced, and provides many other details and perspectives.

[46] R. Dunne (pers. comm.) believes that BIOT Ordnance No. 5 (2007), allowing fishing for only 3 days, may be overly restrictive; 'artisanal' or 'subsistence' fishing as defined by FAO (see separate footnotes) is not permitted in Chagos. He feels that any increase in inshore fishing (by resident Chagossians), through changes in the law, could be partly offset by stopping all recreational fishing, and limiting fishing to subsistence, licensed and sustainable fishing by Chagossians on the east of DG. Recreation involving fishing could perhaps be replaced by tourist/leisure activities (Chagossian-US arrangement) for facility personnel as noted above. Mr Dunne also considers that limited pelagic fishing should not be problematic.

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A balance would clearly need to be struck between perceived appropriateness of a particular fishing activity and risk of over-fishing. This would be particularly important for immediate-needs fishing ('fish for food'), and particularly for any exploitation for economic purposes ('fish for finance').

Fishing has the potential to be a vital food and income source for any resettled population. But the risk involved in any level of fishing activities is that the fish stock with diminish with adverse consequences to both fish populations and reefs in BIOT. It is therefore vital that any resettled population is able to carry out some level of fishing but with strict monitoring tools available to ensure a sustainable level of fishing judged against present stock sizes.

5.2.6 Monitoring and environmental impact assessment

Anticipated environmental consequences of alternative resettlement options, from construction, operations and Chagossian activities, are outlined in sections 5.4 and 8.3. However, full effects cannot be known in advance, especially as details of possible infrastructures, potential future livelihoods of Chagossian and other activities as yet are generic rather than specific.

The only way to fully understand impacts is to monitor environmental parameters over time – before ('baseline' data), during and after resettlement. This forms part of EIA, which should begin before construction of any proposed (significant) infrastructure and/or human activities. EIA enables comparison of how well predicted impacts match actual impacts determined from monitoring. This is necessary for determining the extent of compliance with BIOT ordnances and international agreements, following any development of the island(s) needed for returning Chagossians. EIA and monitoring costs are considered in Section 5.

A broad suite of physical, chemical and biological environmental parameters – including fish populations – should be monitored as part of future EIAs, to determine environmental effects of resettlement infrastructures, operations and human activities (See Annex 5.8). Prior to any resettlement, it will be critical for FCO/stakeholders to consider and agree: a) limits of acceptable change for the various parameters, b) penalties for exceedances and transgressions (causing the problem), and c) who will be bear the costs of dealing with the problem, if thresholds are crossed.

Monitoring and EIA are vital safeguards for ensuring that the environmental health and integrity of ecosystems, islands, atolls and the entire Chagos Archipelago are maintained. Without such measures, environmental deterioration is highly likely or inevitable, whichever re-settlement option is chosen. BIOT's unique international value, and flow of benefits that

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[48] Typically traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amount of capital, relatively small fishing vessels, making short fishing trips, close to shore, mainly for local consumption. In practice, definition varies between countries, e.g. from hand-collection on the beach or a one-person canoe in poor developing countries, to more than 20 m. trawlers, seiners, or long-liners over 20m in developed countries. Artisanal fisheries can be subsistence or commercial fisheries, providing for local consumption or export. Sometimes referred to as small-scale fisheries In general, though by no means always, using relatively low level technology. Artisanal and industrial fisheries frequently target the same resources that may give rise to conflict (http://www.fao.org/fishery/topic/12306/en).

currently extend far beyond the Chagos Archipelago's 200 nm Exclusive Economic Zone (EEZ), would likely diminish in the event of resettlement. The very poor environmental condition across much of the Indian Ocean and islands reflects poorly regulated development and increasing population pressures.

5.2.7 Environmental lessons from the Maldives and other regions

The Maldives, Marshall Islands and other low-lying coral island states face many challenges that will likely confront BIOT if resettled. Prior to the onset of tourism in the early 1970s, environmental pressures from development in the Maldives would have been relatively modest. Within 20 years, a range of practical problems (e.g. sand and coral mining), environmental and other issues emerged (See Annex 5.9). Particularly significant was the need for artificial breakwater in the capital, Malé[49], and the many impacts when islands of Seenu atoll were interlinked. Since 2000, additional problems in the Maldives have included inundation from the 2004 tsunami as well as a swell event and wave overtopping in 2008. These incidents, against a backdrop of global climate change, highlight the vulnerability of these islands; the importance of healthy coral reefs; and the need for new forms of co-existence by Maldivian society within their dynamic but fragile environment[50]. Many lessons learned in these nearby atolls will undoubtedly have application to BIOT in the event of resettlement (see also Section 5.4, Annexes 5.9 & 5.11).

5.2.8 Offsetting environmental damages from resettlement

Construction, infrastructures and operations, along with Chagossian activities, would inevitably put some, but variable pressure, on the environment. 'Monetary' and 'environmental' compensation are mechanisms commonly used for addressing ecosystem damage arising from development. This may have application in BIOT in the event of resettlement. Given Chagossian current engagement with restoration in plantation areas of Diego Garcia, these or similar activities might be appropriate as part of any future environmental compensation.[51] Should resettlement occur, details of any system to help offset collateral damage from development would need to be determined and agreed by FCO and Chagossians.

5.2.9 Decision-making and governance in the event of resettlement

Future governance of BIOT, including ownership issues and local decision-making, will need careful consideration in the event of resettlement, as would associated costs of their establishment and operation[52]. As noted, the environment will be affected by, and should

[49] Extensive coastal infilling and reclamation occurred around the capital, Malé, which is now almost square. This greatly impaired the natural protective capacity of the reefs, resulting in the need for an artificial breakwater on the south of the island for protection against flooding events. This high technology solution, costing US$12 million, or US$8,000 per linear metre, would not have been necessary had the possibility of adverse environmental impacts been considered.

[50] Construction of raised dwellings and other buildings to confront sea level rise and/or overtopping is one example, and a practice of clear relevance to BIOT if resettled. A number of eco-friendly resorts have been developed in the Maldives, again whose best design and construction and operations features would find likely application in BIOT. Particularly eco-friendly examples include the following: Soneva Fushi, Reethi Beach, Gilli Lankan Fushi, 4 Seasons Landaa Giravaru, 4 Seasons Kuda Hurra, Banyan Tree, Kuramathi, Baros, Huvafen Fushi, LUX (R. Dunne, pers. comm.).

[51] Any 'compensation' should not be seen as reparations or punitive measures following resettlement; nor is it intended in this way, but rather as a means of helping to offset inevitable effects of development and human settlement and activity. Care would also be need to ensure that project to offset environmental damages associated with resettlement is not blamed for environmental injury that might reflect other causes, such as seawater warming and coral death from bleaching.

[52] Comprehensive determination of governance details and associated costings, if resettlement occurs, fall beyond the scope of this feasibility study.

also influence many aspects of governance. BIOT laws and MPA ordnances will serve as a broad *'top-down'* framework for management decisions; for example the number of islands that may be developed and overarching fishing regulations. Complementary *'bottom-up'* regulatory bodies and decision-making by Chagossians would also be necessary; for example for provision of local planning laws, building regulations. More detailed discussion of governance issues is contained in Section 4 of this draft report.

5.3 Evaluation of potential resettlement locations

Environmental considerations are critical for comparative evaluation of both island options and resettlement options. As noted, the island options most appropriate for any initial resettlement include Diego Garcia, Ile du Coin and Boddam[53]. Environmental assessment of these island options is summarised below; the environmental criteria used, together with the level of certainty/uncertainty, are shown in Annex 5.10.

5.3.1 Carrying capacity, life support systems ('self-sufficiency)

Rainfall. Atolls/islands with higher annual rainfall allows for greater direct use of freshwater and/or aquifer recharge than for islands/atolls with lower annual rainfall. Hence, according to this factor, the former would be more favourable options for resettlement than atolls/islands with less rainfall.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	Rank
Diego Garcia	3
Ile du Coin	1
Boddam	2

Sustainable aquifer yield. Islands having a larger freshwater lens (aquifer volume) are likely to support a given resident population size more readily than islands having a smaller lens; the size of a freshwater lens(es) increases non-linearly with island size. Hence, in the absence of desalination[54], islands with larger aquifer yields will be more favourable options for resettlement than islands with smaller yields.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	Rank
Diego Garcia	1
Ile du Coin	2=
Boddam	2=

Soil quality and agro-forestry potential. Islands with rich soils will have greater potential for agro-forestry or agriculture (locally grown crops etc.) than islands with poorer soil quality, thus reducing reliance on external sources and associated costs. However, as noted elsewhere, local resource-use can impose a high ecological footprint (e.g. extra water demand from irrigation).[55] Soil quality on Ile du Coin and Boddam is unusually rich in organic

[53] This does not necessarily preclude other islands for any later phases of resettlement although, as noted, a cap on the total number of islands developed may be desirable to maintain the environmental health of Chagos.

[54] Even on Diego Garcia and military facility, freshwater needs can be met using natural sources (rainfall and aquifers).

[55] Under former occupation of Chagos, soil was apparently imported from Sri Lanka on some islands.

matter[56], while on Diego Garcia it is variable but also good.[57] The extent and nature of previous agriculture provides a relative indication of its relative viability on different islands in the event of resettlement. Based on this factor, islands with extensive/diverse agriculture formerly would be more favourable options for resettlement. Under previous resettlement copra production from coconuts was the main agricultural activity and mainstay of the economy. The extent of former coconut operations was: Diego Garcia > Boddam > Ile du Coin.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	**Rank**
Diego Garcia	1
Ile du Coin	2=
Boddam	2=

Coral reef fish abundance. Since fishing would have previously been atoll-wide (rather than island-specific), coral fish abundance on different atolls provides a relative index of this resource's capacity to support Chagossians. Atolls with higher coral fish abundance are likely to have greater capacity to support a given resident island population than atolls associated with lower abundances. Hence, according to this factor, the former would be a more favourable resettlement option than atolls having lower coral fish abundance. Both total fish biomass and targeted fish biomass (groupers, snapper, and emperors) are highest for Peros Banhos, intermediate for Saloman and lowest Diego Garcia[58]. As noted in section 5.2.5, over-harvesting is likely without adequate safeguards in place, including monitoring. Also, impact on fish population size is reported, even at relatively light or modest levels of recreational fishing as on Diego Garcia.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	**Rank**
Diego Garcia	3
Ile du Coin	1
Boddam	2

Sea cucumber abundance. Since fishing sea cucumber harvesting would have previously been atoll-wide (rather than island-specific), sea cucumber abundance on different atolls provides a relative index of this resource's capacity to support Chagossians. Atolls with higher sea cucumber abundance are likely to have greater capacity to support a given resident island population than atolls associated with lower abundances. Hence, according to this factor, the former would be a more favourable resettlement option than atolls having lower sea cucumber abundance. However, non-sustainable exploitation has occurred in recent years[59] – but not on Boddam or Ile du Coin. Highest sea cucumber abundance was recorded from Diego Garcia in 2006, but inter-atoll differences were not significant in 2010, adding some uncertainty to the comparative rankings.

[56] See Ch. 4 and Posford Haskonig (2002) feasibility study. Some soils are phosphate-enriched by guano from nesting seabirds.

[57] On all islands, food crop production may be influenced more by human issues (settlers' capabilities & aspirations) than agronomic limitations.

[58] For reef shark biomass, no significant difference between atolls is evident (Graham et al., 2013).

[59] As noted, there may be a case for no sea cucumber fishing, in which case this environmental would have less or no relevance.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)	**Island**	**Rank**
	Diego Garcia	1
	Ile du Coin	2=
	Boddam	2=

Food from local or external sources. Food obtained from external sources reduces the ecological footprint on Chagos – whichever island(s) may be resettled. Largely due to transport and logistics issues, the cost of importing food is likely to be lower for islands closest to Diego Garcia than for more distant islands. However, this factor could be less relevant if an airport or port (both highly invasive environmentally) were built on an island in an outer atoll.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)	**Island**	**Rank**
	Diego Garcia	1
	Ile du Coin	2=
	Boddam	2=

Building materials from local or external sources. Rocks, sand and cement, in particular, obtained from outside Chagos places less burden on its coral reefs and associated environments than if these resources were extracted in Chagos, reducing the local environmental footprint. Largely due to transport and logistics, the cost of importing building materials is likely to be lower the greater the proximity of islands to Diego Garcia. However, this factor could be less relevant if an airport or port (both highly invasive environmentally) were built on an island in an outer atoll.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)	**Island**	**Rank**
	Diego Garcia	1
	Ile du Coin	2=
	Boddam	2=

Previous human population size and estimated current carrying capacity. Previous population size on different islands provides an approximation of relative carrying capacities. Islands or atolls with higher Chagossian populations formerly (Diego Garcia > Ile du Coin > Boddam) might be expected to support higher populations in the future. Estimated current carrying capacity determined by KPMG and the environmental questionnaire (Section 4) for these islands showed the same relative pattern. Based on past population size, or estimated current carrying capacity, islands able to sustain larger populations would be more favourable options for resettlement than islands supporting lower populations. However, past or present population size does not necessarily reflect concern for the environment or its stewardship, local resource consumption and sustainability or former quality of life (see section 5.2.4).

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 =	**Island**	**Rank**
	Diego Garcia	1

least suitable/most risky island option)	Ile du Coin	2
	Boddam	3

5.3.2 Other natural assets and environmental significance

These environmental factors consider the ecological and wider international significance of Chagos. The logic is that islands or atolls having these values should be less favourable for resettlement than islands/atolls lacking them. However, for many of these factors – including ecological importance[60], biogeographic importance[61] and extent of ecological knowledge[62] – understanding is insufficiently advanced for their use in comparative evaluation of different island options. Nevertheless, in the event of resettlement they should be examined further.

Naturalness. Naturalness reflects the extent to which an area has been protected from, or has not been subject to, human-induced change. Such areas are relatively undisturbed and have higher conservation value than more impacted areas, and include here the outer islands of Ile du Coin and Boddam. According to this factor, these islands would be less favourable options for resettlement than Diego Garcia, which is more disturbed.[63]

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)	**Island**	**Rank**
	Diego Garcia	1
	Ile du Coin	2=
	Boddam	2=

Scientific importance for research and monitoring. The scientific importance of a region, for example for research and monitoring, is also an important consideration. In Chagos, more research has been done in the outer atolls than in Diego Garcia. This makes islands, such as Ile du Coin and Boddam, more important for science, research and monitoring than Diego Garcia, especially for use as an international 'reference' or control site – which is a globally recognised value of the archipelago. Hence, according to this criterion, Ile du Coin and Boddam would be less favoured island options for resettlement than Diego Garcia.

Conclusions on ranking based	**Island**	**Rank**

[60] Ecological importance encompasses biodiversity (range of ecosystems & species richness), biological productivity, critical habitats or feeding areas for species of economic and conservational value (e.g. seafood species, birds, turtles), and as a fishery replenishment area (e.g. source of larvae for adjacent areas). Information for many of these factors in Chagos is very incomplete and complex – as in the case of birds, whose island preference can vary temporally. It is added that presence of a valuable ecological feature (e.g. occurrence of mangroves or special hardwood trees) in itself need not be factor precluding resettlement, as options for infrastructures or activities may be open in areas where these species are not present on the island.

[61] Here, conservational value is given to special biogeographic features, in particular whether the area contains 'endemic' or unique species, or is representative of a biogeographic 'type' or assemblage, or contains unique geographical features or seascapes. Such knowledge is incomplete for Chagos. Not many endemics are known for the archipelago, but levels may be higher than previously supposed.

[62] According to this factor, areas where ecological or environmental information is absent or incomplete should be less favoured development sites than those where reasonable information exists, assuming the latter are suitable from an environmental viewpoint. This will potentially help safeguard unknown and potentially important environmental areas.

[63] The conservation value associated with naturalness is considered the most important application of this environmental factor. However, unforeseen environmental and/or economic consequences, arguably, might be more likely in artificial or degraded areas (e.g. extensive coastal infilling in Diego Garcia, which may be a factor causing need for costly sea defences) than in more natural areas. Applying the naturalness criterion in this way, disturbed islands would less (not more) favourable for resettlement than more natural areas.

on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)	Diego Garcia	1
	Ile du Coin	2=
	Boddam	2=

International significance. This factor includes issues such as whether the area is or has the potential to be an internationally recognised or special protected area. Such areas should be lower priority for resettlement than areas lacking such significance. Eastern Diego Garcia is a Ramsar Site[64] and this island also harbours one of BIOT's ten IUCN Important Bird Areas (IBAs). The IUCN Category 1 No-Take Marine Protected Area (MPA) [65]encompasses all the outer atolls and islands of BIOT – hence Ile du Coin and Boddam, but not Diego Garcia. While all of Chagos is of outstanding international significance, only the large No-Take MPA provides the complete protection needed to underpin the Chagos Protected Area as a global reference site for a wide range of scientific ecological, oceanographic and climatic studies, as well as its continued benefits to humans into the future. According this criterion, therefore, Ile du Coin and Boddam would be less favourable sites than Diego Garcia for resettlement.

	Island	**Rank**
Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)	Diego Garcia	1
	Ile du Coin	2=
	Boddam	2=

5.3.3 Impacts of environment on resettlement - climate change and other factors (atoll robustness)

Sea level rise and coastal intrusion. Atolls or islands with the greatest rates of sea level rise in the recent past may be more vulnerable in the future than atolls/islands with lower rates. These would probably be less favourable options for resettlement than atolls and islands associated with lower rates. Future rates of sea level rise clearly matter more for resettlement risks and prospects. However, projected future rates for different atolls or islands in Chagos cannot be reliably distinguished, and determination is problematic even for large ocean areas[66]. Interplay with many other factors, including coral reef health, present and future reef accretion rates, erosion rates[67] and storminess[68] creates further complexity

[64] On account of Diego Garcia's internationally significant wetlands.

[65] Created in 2010 as part of the Pew Ocean Legacy Program.

[66] Recent research (Jordà, 2014) suggests that it will be almost certainly impossible to discern a trend before at least 2023 and possibly as long as 2043 using satellite altimetry data. Since the length of the tide record data is even shorter, meaningful results may not be possible for many decades. For future scenarios, IPCC's RCP 4.5 & 6 projections for next 40-50 years are considered most appropriate estimates, but clear regional differences within Chagos are not evident.

[67] Coral reef accretion rates in Chagos have not yet been determined. A study of coastal erosion and shoreline changes in Diego Garcia is underway (S. Purkis, in prep.). Preliminary findings indicate very complex coastline changes over the last half-century. Some coastal areas on Diego Garcia appear to have sediment accumulation while others have eroded. Interestingly, the net coastal change is close to zero; island area gained by shoreline extension is cancelled elsewhere by retreat – excluding modified areas (i.e. port, airport). It is not yet clear if there are differences in between Diego Garcia, Ile du Coin and Boddam, although patterns for these islands may well also be very complex.

[68] Wave size and storminess are also determinants of vulnerability to coastal erosion. However, inter-atoll differences for Chagos are not evident. The last known cyclone to pass over the islands was in 1891 (Posford Haskonig, 2002), and there are no projected future changes in either the location of the tropical cyclone belt or frequency of storms for the Indian Ocean (IOPC, 2013a,b).

and uncertainty. This limits their inclusion in comparative evaluation of different island options. The relatively likelihood of overtopping and saline intrusion into aquifers is also difficult to determine at present, although issues related to these impacts are considered further below.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	Rank
Diego Garcia	3
Ile du Coin	1=
Boddam	1=

Tectonic movements. Atolls/islands associated with past or known tectonic activity should be less favourable resettlement options than atolls/islands where it has been unrecorded. A tremor in the 1800s destroyed an island in Perhos Banhos, resulting in loss of productive copra plantation; there is suggestion of a tsunami wave in the lagoon at Diego Garcia in 1983, while in Saloman atoll no hint of tectonic activity has been observed. However, data are limited.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	Rank
Diego Garcia	2=
Ile du Coin	2=
Boddam	1

Extent of atoll enclosed by islands and reef flats. The degree of atoll enclosure influences protection to islands against wave action and hence also coastal erosion. Because islands within atolls having a high level of enclosure will be less vulnerable to these physical disturbances, they will be more favourable options for resettlement than islands within more open, exposed atolls. However, lagoon waters in protected atolls will be more prone to warming events – due to poorer water circulation; this increases vulnerability of corals to bleaching and mortality; this can lead to diminished reef health and accretion rates, thus potentially undermining reef and island resilience. Considered in this way, more enclosed atolls and islands might be less favourable options for resettlement than more open ones. While the protection of islands afforded by more enclosed atolls may be more important for resettlement prospects than reduced reef resilience, consideration of atoll openness as a factor carries considerable uncertainty.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	Rank
Diego Garcia	1
Ile du Coin	3
Boddam	2

Size of island. Qualitatively, islands having greater height[69] and area might be expected to be more substantial and robust than smaller ones against sea level rise and other physical environmental disturbances. Hence, these islands would be more favourable resettlement

[69] Island profiles are likely to influence overtopping risk more than average island heights and many other features, including sediment composition are also important.

options than smaller ones – aside from greater space available for development. The (total and potentially habitable) area[70] of Diego Garcia is much larger than Ile du Coin or Boddam, and its maximum height (more than 5 metres) and breadth are also greater[71]. However, average values can be misleading. Diego Garcia also has extensive tracts of low-lying shore, close to sea level, and overtopping occurs (See Annex 5.2b). The interplay of these and other factors, such as beach width and rock/coral porosity (which are variable), is highly complex. Many uncertainties remain, and full details are not known for all islands. Hence the comparative evaluations according to size of islands are tentative[72].

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	**Rank**
Diego Garcia	1
Ile du Coin	2=
Boddam	2=

Approach and ease of access. Navigational hazards (coral heads etc.), exposure to wind and waves, jetty needs are among the natural environmental features influencing the safety of approach to shore and ease of access to BIOT islands. Some of these vary seasonally, i.e. according to the monsoons. Islands with relatively easy approaches will be better options for resettlement, from practical and economic standpoints, than those that are more hazardous.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	**Rank**
Diego Garcia	1=
Ile du Coin	3
Boddam	1=

5.3.4 Potential of natural resources for economic activities

Ecotourism value of fishing and coral reefs for diving. Pelagic/game/recreational fish are potentially important resources for economic activities (e.g. tourism). However, detailed data on abundances for different atolls are not available although, as noted, targeted fish biomass (groupers, snapper, emperors) are highest for Peros Banhos, intermediate for Saloman and lowest Diego Garcia.[73] The ecotourism value of coral reefs for diving may have even greater potential to generate economic revenue than resource extraction[74]. Islands/atolls with the most attractive and least disturbed coral reefs (or terrestrial habitats) will have greater

[70] Islands extensive in area do not necessarily provide a greater supply of sediments, which may help replaces losses due to erosion, compared with smaller islands. Nevertheless island area and land availability are also an environmental issue for other reasons. Islands which already have sufficient land area for development may incur less environmental injury than islands in which extensive dredging and infilling are necessary for the creation of artificial land for infrastructure or other facilities. Globally, these two activities are increasingly recognised as major impacts affecting shallow-water marine systems, such as coral reefs and their interdependencies.

[71] Hence, the choice of Diego Garcia for the US military facility is unsurprising.

[72] While comprehensive survey data are available for Diego Garcia, less detail is known for the other potential island options.

[73] However, as frequently noted, without adequate safeguards and monitoring, marine resource quantity and quality can easily diminish, even at relatively modest fishing levels.

[74] In the Maldives, reef sharks live in sites that divers like to visit, but fishermen catch them at night. C. Anderson (pers. comm.) has estimated the value of sharks from divers to be $2 million annually, compared with only $0.5 million for export. Anderson has also put a price tag on an individual shark: $3,000/yr/shark as revenue from divers, compared with $30/yr/shark dead for export.

appeal to tourists than islands/atolls having more impacted reefs. However, reefs once pristine can easily become degraded and coastal development pressures, as has occurred in some parts of Diego Garcia[75], and by coral damage from heavy diving.

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	Rank
Diego Garcia	3
Ile du Coin	1=
Boddam	1=

Ecotourism value of islands for land and inshore recreation. In contrast to the marine environment, the terrestrial environment of Diego Garcia would probably have greater recreational and conservation attraction than Ile du Coin or Boddam. This reflects the extensive vegetation assemblages and important wildlife, including large populations of green and hawksbill turtles and birds on Diego Garcia[76]. As noted, the only Ramsar Site (for internationally important wetlands) in Chagos is on eastern Diego Garcia. This island also harbours an Important Bird Area (IBA).

Conclusions on ranking based on atoll data (1 = most suitable or least risky island option; 3 = least suitable/most risky island option)

Island	Rank
Diego Garcia	1
Ile du Coin	2=
Boddam	2=

5.4 Summary environmental comparison of resettlement options

The most likely options for any initial resettlement of BIOT are option 3 (pilot, small-scale re-settlement) or option 2 (medium-scale re-settlement) – probably in Diego Garcia, with possible later expansion involving option 1 (large-scale re-settlement) on the outer islands – such as Ile du Coin or Boddam. A summary environmental comparison of these options is outlined later in section 8 of this report. These are separated into indicative (or anticipated) construction and infrastructure effects (Table 8.2) and operations and activities effects (Table 8.3). Environmental comparisons are provisional, pending comprehensive specifications of design and construction requirements for facilities needed in the event of resettlement. Environmental impacts would increase, progressively, depending on the resettlement option.

For any resettlement option, ongoing environmental monitoring is essential for determining the severity of projected impacts and effects of any remediation intended to alleviate these[77]. As noted in section 5.8, environmental monitoring should be an integrated component of resettlement before, during and after any resettlement. The outer islands would be essential 'reference' sites for monitoring effects of resettlement in Diego Garcia. Undeveloped outer islands would also be important for this purpose in the event of resettlement of Boddam or

[75] Recreational fishing on reefs from boats and, in particular, anchor damage to reefs can quickly constitute a major environmental problem following diving and ecotourism. Should this develop in BIOT, fixed moorings, fishing regulation and many other conservation measures would be needed.

[76] However, high conservation attraction could also increase risks to wildlife populations on Diego Garcia from any (further) recreation and ecotourism – on top of visits to these areas by personnel at the US military facility.

[77] For any island, monitoring should be undertaken probably twice a year, using a broad set of environmental parameters as outlined in section 2.4.

Ile du Coin. As noted, this would likely be very harmful environmentally. In the event of resettlement of the outer islands, it would be also necessary to scale up routine MPA monitoring (e.g. during research cruises aboard Pacific Marlin), to determine if impacts extend beyond any resettled islands and compromise MPA integrity. This would likely increase overall environmental monitoring costs (See annex 5.8; section 7) as well as ongoing routine research assessing the status of the Chagos MPA.

5.4.1 Option 3 (small-scale resettlement) and option 2 (medium-scale resettlement)

Anticipated environmental effects of construction and infrastructures for this resettlement option are summarised in Table 5.2[78]. Impacts are inevitable, but overall are projected to be substantially less than from resettlements on the outer islands, as an airport and port – both highly invasive, environmentally – already exist (only) on Diego Garcia. This is consistent with the relative robustness of Diego Garcia to resettlement impacts, in comparison with Ile du Coin and Boddam, in the questionnaire survey (Section 4)[79]. Particularly significant is that Diego Garcia does not lie within the Chagos No-Take MPA. However, as noted, a Ramsar site (containing internationally significant wetlands) encompasses the eastern side of the island. This part of Diego Garcia is a potential resettlement area. Siting of construction, infrastructures and facilities should avoid loss or injury of habitats and important wildlife in the most sensitive areas[80]. In addition to the established Important Bird Area in Chagos, another has been proposed, in view of significant populations of Red Footed Boobies in eastern Diego Garcia from the Plantation Gate to Barton Point, plus East, Middle and West Island. On the main island, construction should be avoided in and around these areas.

In order to retain the ecological integrity of a resettled island, quotas should be determined and set on permissible maximum areas of each island, its coral reefs, vegetation and other habitats that may be a) removed and b) degraded by construction and infrastructures. A provisional threshold of 10% may be appropriate, but figures may need to vary according to habitat type and pending further consideration of this.

Non-sustainable use of coral and sand for building creates major impacts on reefs. For any significant infrastructures, imported materials will help alleviate problems, but of course this incurs a heavy immediate financial cost. Similarly, caution is needed on to ensure that timber for construction or other purposes is not harvested sustainably.

Impacts arising from a range of operations and human activities are inevitable in the event of resettlement under options 2 or 3 (in Diego Garcia); several can be reduced if mitigation measures are adopted (Table 8.2). New impacts would naturally add to pressures from operation of the military facility and other existing human activities.

As noted, environmental effects of construction and operation of resettlement are inevitable, but can be ameliorated to a greater or less extent. Annex 5.11 presents a schema for environmental criteria used in evaluation of proposals for the development or redevelopment of tourist resorts in Maldives. Many of the impacts and mitigation measures are potentially

[78] As yet, only indicative impacts from construction, infrastructures and operations given, as outlined facilities for resettlement at this juncture are more notional than specific, pending more detailed specifications being drawn up.

[79] There was also a consensus from questionnaire respondents that none of the islands, apart from Diego Garcia, could sustain a resettlement based on a modern lifestyle. The ecology generally is seen as extremely fragile and resettlement likely to cause major environmental damage. It would be preferable to limit future development to Diego Garcia, since it already has the infrastructure to support a modern lifestyle.

[80] The Ramsar site and adjacent southern 'barachois', which is also protected, is of particular importance for juvenile Hawksbill turtles and other wildlife.

applicable to the proposed resettlement option in Diego Garcia (and particularly to Ile du Coin and Boddam, as described below).

5.4.2 Option 1 (large-scale resettlement)

In general, completely undeveloped remote islands are rather hostile environments, and requiring significant infrastructures and facilities to make them 'habitable and hospitable'. These inevitably carry extremely high environmental as well as financial costs. This is consistent with the relative fragility of Ile du Coin and Boddam to resettlement impacts, in comparison with Diego Garcia, in the environmental survey (see section 4).

Projected environmental effects of construction and infrastructures for this resettlement option are summarised in Table 8.2. Overall, impacts are likely to be far more substantial than for the resettlement options 2 or 3 in Diego Garcia above. Resettlement of the outer islands would likely require an airport, port or both. Construction and operation of these infrastructures are extremely invasive environmentally. Coral reefs would be adversely impacted, and a wide-range of secondary impacts (e.g. from shipping, pollution) would also be expected. Particular concern arises because Ile du Coin and Boddam (plus all other BIOT islands except Diego Garcia) lie within the Chagos No-Take MPA and part of the Pew Big Ocean network. As noted, the MPA encompasses exceptional conservation values that benefit BIOT and other countries. Resettlement will inevitably erode these values unless the MPA ordnances and BIOT regulations are strictly adopted.

Construction of roads would also incur greater impact than in Diego Garcia, in view of their complete absence on the outer islands and need for extensive vegetation clearance. Impacts from construction of other facilities (housing, other buildings, etc.) would be broadly as for 'modern' resettlement option in Diego Garcia (See Table 8.2).

Many of the impacts expected from operations and human activities in Ile du Coin or Boddam, if resettled (Table 8.3), are similar to those likely for a Diego Garcia resettlement. However, in the event of tourism developing on the outer islands, impacts from diving and snorkeling, boating, fishing and other tourism activities could become increasingly prevalent and harmful unless carefully controlled. Anchor damage and fishing above safe levels are particular concerns should resettlement proceed, not only in the outer islands but in Diego Garcia also. Annex 5.11 addresses these and other potential concerns (e.g. conservation of flora and fauna) further, based on experiences in the Maldives. This also examines environmental issues relevant to infrastructures and facilities appropriate for Ile du Coin and Boddam, including methods of energy generation and conservation; water production and conservation; sewage treatment and disposal; and solid waste collection and disposal.

6 INFRASTRUCTURE ANALYSIS

6.1 Introduction and overview

People have lived on various islands in BIOT for several hundred years and during that time inhabited some form of housing, have had access to drinking water, disposed of liquid and solid waste in various ways, and have utilised copra waste and other fuel wood as a cooking or heating source. Commerce also waxed and waned, and basic infrastructure to support those endeavours existed, for example, copra post-harvest production, rails for hand-pushed trolleys to transfer materials to processing areas and then to jetties etc. However these infrastructures are now dilapidated and any resettlement would need all infrastructure to be built new to meet modern quality and efficiency standards.

However, much has changed over the years that today have a bearing on the practicality, cost, and so feasibility, of replacement or additional infrastructure. Potential population size, the geo-political realities of the need for UK-allied strategic military capability in the region, contested sovereignty claims from Mauritius, the designation of an arguably unique international marine environmental protected area reserve, and from the perspective of this study, a myriad of changes to what are considered to be acceptable international best practice and infrastructure standards.

Expectations around living standards have also changed with many potential settlers expecting a similar standard of living that of 21st Century UK. In considering what is practical and affordable, the team has also compared expectations with the provision of housing and public services available in other British Overseas Territories, and looked at a range of norms in the region and in other Small Island Developing States (SIDS)[81].

These discussions have been taken into consideration by the KPMG team, and are factored into the overall feasibility report and its infrastructure sub-components. At the same time, consideration of the need for infrastructure has taken into account the following core principles:

- do minimum additional harm to the environment and/or people;
- focus on environmental protection and sustainability;
- take into account economic and financial affordability, value for money, and sustainability;
- review demands and requests neutrally and objectively; and
- respond to reasonable needs with feasible options.

The remainder of this section discusses the key infrastructure requirements likely to be associated with any possible resettlement. It summarises the key sources of information on

[81] The SIDS are a group of 52 island economies working together in three geographic regions: the Caribbean Islands; the Pacific; and Africa, Indian Ocean, Mediterranean and South China Sea (AIMS). Most share common development challenges, generally related to small but growing population sizes, limited resources, remoteness, susceptibility to natural disasters, vulnerability to external shocks, excessive dependence on international trade, and fragile environments. They have relatively small geographic size, high costs of doing business, high communications, energy and transport costs and in some cases, risk from sea-level rise (e.g. Maldives). They are often economically highly dependent on tourism and tend to have a disproportionately expensive public administration and infrastructure due to their small size, with little opportunity to create economies of scale.

which the team has drawn, and the key assumptions underpinning the predicted costs of infrastructure development, which are set out in detail in section 7 of this report.

6.2 Assessment of key infrastructure issues

6.2.1 Design, cost and contracting issues

The Chagos Islands pose specific and complex design and contracting challenges and these inevitably have a bearing on probable cost scenarios and contingencies that may be required for risk mitigation. Design can be divided into two broad grouping: a) for Diego Garcia and b) for other islands.

Diego Garcia. At present, the BIOTA on Diego Garcia comprises a staff of approximately 50, each with clearly defined terms of reference and responsibilities, within which military salaries and service requirements permit personnel costs to be held to well below the market rates for such remote locations, without access to provision of a wider range of recreational and rest facilities. Civilian international contractors providing services have costs substantially in excess of the current BIOTA arrangements.

Infrastructure design on Diego Garcia fulfils military service specifications, and generally assumes unaccompanied status for staff (i.e. neither spouses nor children). Medical services are basic and patients with even moderately complicated issues are "medivacked" to alternative locations by air. Potable water, all of which originates from rainwater and aquifers, is not presently available on tap in accommodation facilities on Diego Garcia. It is only available from water bowsers "buffaloes" spaced at regular intervals around the facility – from which bottles/containers are filled for carrying back to accommodation blocks.

In practice the western arm of Diego Garcia is a UK/US military environment, and the eastern arm is an unoccupied nature reserve with occasional unpaved road re-grading by US contractors at the request of BIOTA. This region encompasses the Old Plantation and its heritage sites, and provides the most practical site for any resettlement on Diego Garcia.

Other islands. The other islands lack adequate airport and/or landing strip provision, and lack any physical means of getting people and supplies ashore. This would need to be addressed in any design that included islands other than Diego Garcia as a habitation option. An airport has particular challenges (including overall airspace security) and costs, and is a less practicable prospect than the building of marine shore structures capable of handling ship cargoes and passengers. Diego Garcia US NSF and BIOTA buildings are generally robust, and in the past have made limited efforts to incorporate energy-efficiency features, are not architecturally in keeping with regional or historic styles, and materials are generally sourced from regions outside BIOT.

In terms of cost all commodities and materials used in BIOT is extremely expensive for a combination of reasons:

- because of the US military-linked contracting process, which tends to require the highest performance standards with arguably more limited regard to cost;
- partly because of the transportation cost of materials and the cost of staff for this location;
- the absence of any credible local competition for delivery of goods and services which comply with US Department of Defence procurement standards; and
- the relative infancy of a local competitive market, supply-chain arrangements and related public and private sector institutions.

Thus proposals from other regional sources for food, cement, steel, wood and other building materials will always tend to seem to under-cut the current prices being paid. But to take such comparisons at direct face value would be to ignore the sunk costs of airport and harbour provision on Diego Garcia, the existence of roads, electricity, basic accommodation for contractor staff and the international competitive tendering processes which led to the current arrangements – which if added to or factored into competing tenders would substantially reduce the superficial cost differentials, with new bid unit costs rising substantially, particularly with respect to initial mobilisation costs.

This has posed particular challenges for this study, since there are few direct comparisons and comparators that can be applied, as might be the norm on a more typically populated island, or mainland regimes. For example, in the UK, the Royal Institute of Chartered Surveyors might be an appropriate institution against which to "benchmark" prices [REF/footnote]. Instead, we have reviewed relevant regional institutions, professional engineering and building bodies, international maritime and aviation authorities, and a number of regional bodies and countries to identify a range of costs that permit an estimate to be inferred for particular infrastructure provision. Even so, without more detailed site investigation against specific designs, any particular estimate remains 'indicative' and subject to a wide range of design and cost uncertainty.

An often neglected and underfunded matter is maintenance of infrastructure assets – as evidenced routinely in many countries by severely potholed roads. In general, routine maintenance results in long-term cost reductions, when compared with the alternatives, which tend to be partial or complete replacement. Some of the key approaches and issues are set out in Annex AI.2, which also gives guidance on the percentage of capital value that should be used for maintenance.

BIOTA on Diego Garcia, as part of the overall leasing arrangement to the US NSF, benefits from the services provided by the current prime US contractor, G4S. It is mandated that Federal Contracts for Diego Garcia be a Joint Venture (JV) between a US Prime Contractor and a subsidiary UK company[82]. There is no independent UK service provision, outside of that provided by the BIOTA staff on Diego Garcia. All services and all other supply logistics are by means of request to the US military and US State Department, which are translated into a service order to G4S, which provides a cost estimate for BIOTA approval and payment. This arrangement would need to be re-negotiated to be made available to any wider expansion of a civilian population on Diego Garcia or the other islands, and alternative contracting arrangements are likely to need to be put in place. Importantly, there can be no automatic presumption that existing US navy facilities on Diego Garcia would continue to be made available to an expanded BIOTA (e.g. airport, harbour, water supply, wastewater treatment, solid waste disposal, electricity, etc.). This would all be a matter of future negotiation between the UK and US Government.

6.2.2 Transport and island access

One of the greatest physical challenges for any potential inhabitants of BIOT is their remoteness, distance from each other, and from any sizeable mainland. Air and sea transport to and between the islands are the two modes that have been considered in this study. For each, the options depend largely on the number and type of transit movements required.

[82] For example, the San Juan Construction Company Inc., formed a JV with John Laing International to win and implement a US$14.16M construction and services contract on Diego Garcia between 2001 and 2004.

Air transport. For a stable small population (say 150 to 500 people) based on Diego Garcia, semi-commercial arrangements using either existing or enhanced flights to the US NSF may be sufficient.

For additional movements to Diego Garcia, arrangements with commercial carriers will have to be negotiated between the UK and US Governments and the commercial entity – and there will associated re-fuelling, customs and passenger-handling personnel and infrastructure costs. Onward transit to the other atolls in the Chagos Archipelago could possibly be done by seaplane, subject to a range of local handling, tethering, air-traffic control, and safe re-fuelling arrangements – all of which would have associated costs.

KPMG has considered the option of building a new airfield as proposed in the "*Returning Home*" 2008 Chagos Refugee Group proposal and conclude that the likely costs to build a facility capable of international civil aviation accreditation will be much higher than the £4 million estimate proposed. We generally agree with the caveats provided by former USAF Airlift Command CO on Diego Garcia Major Morris of the Turner et al CCT 2008 rebuttal of the Howell Report. His estimates of £80 to 100 million for an island runway seem reasonable, and additional capital costs of, for example, electronic instrument landing systems at US$5 million/1,000 ft (305 metres), are also to be anticipated. His estimate of *circa* US$8 million per year maintenance and operational costs for a new civilian airport is reasonable.

Airport construction, maintenance and operation to international standards is a particularly challenging matter – even without the complexity of access to the airspace of the US NSF[83]. The on-going liability to HMG, even with a commercial operator managing such a facility would be considerable, and these matters are discussed in more detail in Annex AI.3 In terms of comparable airfield construction and costs, St Helena airfield (1,650 metres, concrete), which requires substantial valley infill civil works, will cost some £200 million for design and construction (more than 60% completed), and is likely to cost £46 million for 10 years of airport operation. Montserrat airfield, a 600-metre runway will cost approximately £17.5 million.

Sea transport. Diego Garcia NSF harbour has the capacity to handle the berthing requirements of a ship of equivalent tonnage and size to the existing Fisheries Patrol Vessel Pacific Marlin (details of the ship are provided in Appendix A). A different and additional vessel would be required to provide cargo handling and passenger transit support to a larger civilian population on either Diego Garcia or any other islands. This would again require staff support, maintenance facilities, safe waste-disposal and re-fuelling capacity that would need to be negotiated between the UK and US government. Ocean currents and navigational issues would need careful consideration for vessels used to transport Chagossians and freight.

Island access. Other than on Diego Garcia, there is no existing provision to land safely onshore in other than small craft capable of being beached. In all cases where development associated with resettlement is considered, new marine landing structures will be required. These will generally need to be much more robust and capable of ship mooring and handling to international safety standards than any built in the past for copra trading. A particular feature of any resettlement will be the extreme peak load that facilities built will need to handle during the initial stages of building – when mechanical equipment and materials need to be transported ashore.

[83] San Juan Construction was awarded US Navy Contract N62742-01-C-1300 jointly with John Laing International, to construct a new aircraft intermediate maintenance facility on Diego Garcia (and associated civil and electrical works) between 2001 and 2004, at a cost of US$14.16 million.

KPMG has assumed a minimum safe water depth of 5 metres at the end of any pier or jetty that is built. Landing craft and/or small outboard-engine boats or sailing dinghies running ashore are not a practical proposition for civilian populations of mix age and ability and cargo movement. Additional design issues for jetties and marine structures are discussed in Annex AI.4, which also provides e-reference to the US Navy design codes required for military operations.

Sea defences. US Navy-sponsored studies by Moffat and Nichol (2008) and Helber Hastert and Planners, Inc (2009) (Contract spreadsheet summary data provided in e-link) indicate between 1-2 ft per year of shoreline loss on Diego Garcia. As a result, the US NSF is undertaking a number of revetment[84] construction processes, for coastal defence.

Costs are complex to calculate, given the need to bring in materials by barge and tug (some rock once controversially from Mauritius), but an indicative cost may be seen from an award of US$8.9 million to Black Construction-Mace International JV to repair 700 ft of revetment on Diego Garcia in 2010-2011[85]. In a written Ministerial Statement the FCO PUSS flagged a US expenditure of over US$30 million during 2014/15 to protect the Diego Garcia shoreline from gradual erosion[86].

On low-lying islands where tidal or storm inundation at regular intervals is to be expected, most sea-defences would be unaffordable and impractical. Instead, infrastructure housing (e.g. raised on 'stilts'/pillars) and equipment will need to take account of this threat. Storage tanks cannot be buried under-ground – they may "float" and catastrophically break connecting pipes and equipment, so elevated building solutions are likely to be preferred. Saline intrusion will pose a design challenge to metal structures (corrosion) and electrical cables. It is possible to construct buildings that will "float" within restraining rails/dolphins, and examples from the Netherlands and UK are cited in Annex AI.5, however, the coral rock substructure is likely to complicate suitable building anchoring. No such solutions exist in the Chagos Archipelago at present. Clearly "houseboat-type" solutions are possible too, but maintenance costs are likely to be higher than for more traditional structures.

Roads on Islands. Diego Garcia has a mix of concrete and bituminous road surfaces (1-2 vehicle lanes) on the western arm. On the eastern arm, parts of which may be flooding with increasing occurrence (Sheppard/ref), is a periodically re-graded rural unmetalled single-lane road surface. In the event of resettlement, it would be necessary for walkways on some islands to be elevated by between 0.25 and 0.5 metres to permit transit between buildings in the event of sea over-topping the outer perimeter ridge, or at occasional extreme high tide events when groundwater rises to flood some of the terrain.

Initially, a bituminous surface road of approximately 10 kilometres length and two lanes width (less than 5 metres with some passing points for extra-large vehicles) would be required for the eastern arm of Diego Garcia if that was substantially resettled. For the other islands, crushed coral rock surface walkways and paths and possibly reinstated rail tracks would suffice in any initial phase. The islands are sufficiently small to render the general use of motor cars unnecessary (and undesirable on environmental, safety, operational and maintenance grounds).

Infrastructure costs for other Overseas Territories are only partially applicable, since terrain and supply-chains are very different. But, for example, on St Helena, for average width roads of 3.5 metres, existing standard roads cost £73.2k/kilometre, and for new build to higher

[84] Revetment: engineered rock shoreline armouring to prevent erosion and inundation.

[85] 2010, October, NAVFAC press announcement: http://www.navy.mil/submit/display.asp?story_id=56469

[86] 2014 March 6th, Diego Garcia: Lagoon Environment, Parliamentary Under-Secretary of State for Foreign and Commonwealth Affairs (Mark Simmonds), written Ministerial Statement, ~1pp.

specifications (DA01 2010 draft), then £97.1k/kilometre. Based on an annual roads maintenance budget of approximately £380k, less 20% for bridges maintenance, then annual maintenance costs are approximately £3k/kilometre.

On Montserrat, roads cost around £475k/km with in-house construction. This cost includes base drainage, minor land acquisition and minor culverts. Private contractor costs are not known. The costs to maintain 107 kilometres in-house are £3.2k per annum. There are 2,467 vehicles registered, most of which are cars, MPVs and 4x4 light vehicles.

6.2.3 Shelter, governance, and law and order facilities

Shelter. A range of facilities would be required for normal full-time residents. These would include a range of accommodation buildings for single, double, or multiple occupancy, at least one meeting and recreational facility, administrative offices, and provision for shop(s), medical and postal services, telecommunications and schooling/play areas. A guide to a wide range of Building Costs is provided in Annex AI.5.

In St Helena, the total combined capital value of a new St Helena HM Prison, Ogborn House and police station is approximately £250k. Annual maintenance for administrative buildings is £173k. There are 208 government-owned houses, of which 44 are beyond economic repair. Some £414k is spent annually on upgrade and reactive maintenance of 177 social houses, which have a capital value of approimately £5.2 million. Chief Secretary houses have an estimated capital value of £4.3 million. A planned comprehensive maintenance refit is estimated to be likely to cost £738k. In Montserrat, the cost of a new two-bedroom house (708sq ft) is £42.1k and a three-bedroom house (910sq ft) is £54.2k. A three-storey administrative/ministry complex (6,000sq ft) is £595k. The maintenance of 117 public buildings costs £1.3 million per annum[87]. New builds and maintenance if contracted out (local SMEs) follow JCT IC[88],[89] or DB[90]. Larger (international) contracts follow FIDIC red[91].

Governance, and law and order facilities. The existing administration on Diego Garcia lacks an independent conference/magistrate's meeting room and has to share bookings with US NSF personnel. Any additional load would require an independent facility to be built. A proposal to provide new BIOTA administrative meeting room and administrative office facilities for existing needs has been priced at US$6 million. In addition, police and customs/border patrol staff numbers would need to rise by at least 3-4 police[92] and additional holding cell and jail facilities would be required. All these will need to be built to at least satisfactory European international standards. Additional standard Land Rover transport or police would be required, each with maintenance and operational cost implications. Government vehicle fleet maintenance on Montserrat (70 light and 70 heavy/construction vehicles) costs approximately £196k per year.

6.2.4 Energy and fuel

[87] OTD/DFID Engineers' advice for St Helena & Montserrat.

[88] Joint Construction Management (Trade), http://www.rics.org/uk/shop/contracts/JCT2011/?utm_source=Bing&utm_medium=cpc&utm_campaign=JCTContracts

[89] JTC Intermediate Building Contact, http://www.jctcontracts.com/contracts/98/9805ic.jsp

[90] JTC Design & Build Contract, http://www.rics.org/uk/shop/JCT-2011-Design-and-Build-Contract-DB-18815.aspx

[91] International Federation of Consulting Engineers (FIDIC), Construction Contract 1st Edition (*et seq*) (1999 Red Book), http://fidic.org/books/construction-contract-1st-ed-1999-red-book

[92] Interview with BIOT Police, Diego Garcia, May 2014

Energy (electricity). Several key design principles will need to be determined before detailed planning and costing is finalised, as follows:

- For Diego Garcia, would off-take from the US NSF be possible/permitted?
- If not, then would an "*off-grid*" unitary housing solution or a centralised mini-grid from one or more core fossil-fuelled electricity generating unit(s) be appropriate?
- What would be practical and value for money renewable energy supplements (e.g. solar (PV, thermal, Concentrated Solar Power), wind, wave, heat pump, and biomass burning/incineration (from coconut wood/husks and other waste)?

The main Diego Garcia electricity generating facility on Diego Garcia includes eight 2.2 MW diesel generators in the North Power Plant. These are 30 years old and inefficient, and a replacement programme is underway with completion of the replacement of two units (No 7 and No 8) by August 2014-August 2015, with two new 4.4 MW units at a combined cost of US$11.4 million and US$10.7 million respectively[93].

Wave power has been considered, but has a number of engineering, installing and operational and maintenance challenges that are likely to make it a less favourable option. Additional information on energy and electricity is provided in Annex AI.6. Where practicable, the design principles of environmental sustainability and lower operational/recurrent cost are important factors.

Power generation for St Helena is primarily provided by three 1.6 MW Caterpillar generators along with another 2 back-up elderly 1.0MW Rushton generators and a single 0.8MW Caterpillar generator at Rupert's Valley power plant. The approximate cost to produce electricity is £0.24 per kWh, and the Utility Company Connect St Helena charges consumers between £0.23 and £0.44 per kWh according to a three-band tariff structure.

On Montserrat, peak diesel generator demand had reached 2.0MW before demand was reduced through price rises in the basic tariff, which ranges between £0.11/kWh to £0.13kWh. Fuel consumption of electricity alone is approximately 3.2 million litres of diesel per year. A new 1.5MW diesel power station is likely to cost £5.3 million, with maintenance and operational costs at £119K per annum, totalling £1.95 million. Geothermal options are being explored, with likely capital costs of around £30 million for a 3.5MW facility.

Fuel. Motor vehicle fuel on Diego Garcia is provided by the US NSF and whilst kerosene suitable for aircraft engines is available (JP-5), it results in significant maintenance problems and adaptation requirements for BOITA vehicles. Costs per gallon are cited in Annex AI.1, and are US$0.71, 0.82 and 0.69 respectively for JP-5, MoGas and Diesel. Diesel for the Pacific Marlin is also provided via the US NSF as are storage, handling and fire-defence systems. Operational costs are circa £2.5 million per year at present including fuel costing about £1 million annually. On both Diego Garcia and any resettled islands, the prevention of fossil fuel leaks into the marine and land environment will be an absolute imperative, as will adequately trained and equipped fire-defence personnel. New and additional fuel storage and handling facilities will be required.

6.2.5 Other basic services

[93] Data provided by Public Works Officer, NSF Diego Garcia, in December 2013 "Infrastructure update (for Official Use only).

Safe drinking water. Useable groundwater exists in the form of "freshwater lenses"[94] on medium to large sized islands. These freshwater lenses, coupled with rainwater captured via downpipes from roofs, provide a substantial and previously adequate supply of fresh drinking water for all larger islands. Groundwater lenses are also susceptible to pollution from chemicals, oils and fuels, and potentially, pathogens from buried bodies[95]. On Diego Garcia, the US NSF drinking water source is supplied by a network of 99 wells located in the NW section of the island. Groundwater from these wells is pumped to treatment plants in the Cantonment and Air Operations areas where it is cleaned and disinfected. A Military Construction Project (MilCon P-184, US$26 million) to treat and distribute potable water through pipelines to be available in domestic and administrative accommodation taps is in progress, with a completion date of end July 2015. This plan makes no provision for any substantial change of existing use or user numbers[96].

Toilet facilities and waste disposal. It has been assumed that modern pour-flush systems with reticulated water supply systems will be required. Alternative options such as ventilated pit latrines pose threats to the groundwater lens, and are unlikely to be attractive operationally to any returnees. The "WELL" resource centre at the University of Loughborough provides a substantial information resource on the subject. "Grey water" re-use would be a prudent design approach to reduce discharge volumes and is discussed below.

Wastewater treatment will be required, with liquid discharge of a permitted standard to the extremities of the atoll reef edge by some form of outfall pipe. The existing array of species present before discharges commence. The engineering difficulties and costs to both build and maintain such systems will also play a key role in determining which are the most feasible options.

Solid waste from the treatment process, and household rubbish may have to be collected and removed from islands at intervals, and appropriate additional storage and containment systems will need to be built to take account of the total requirement (probably on Diego Garcia as an interim consolidation point before removal of any residue to a mainland environment).

Heating, cooking, cooling and lighting. Energy and electricity use and requirements underpin these elements of basic services, and make the difference between a subsistence existence and the possibility of modern living with most 21st century amenities. Biomass with low moisture content (dried/pelleted or shredded coconut fuel sources are a possibility) can be used for cooking and heating purposes and number of commercial companies offer woodchip burner systems for a range of scales (e.g. Heizomat[97], ETA HACK[98], IHC-Innasol[99], HERZ[100]). HERZ Combustion units capable of servicing the heating needs of ten dwellings cost between £75k and £120k on the UK mainland.

[94] The term "freshwater lens" should not be taken to imply a distinct freshwater aquifer floating on a saline pool in coral rock. Rather, there is no distinct boundary between freshwater and seawater, but rather a transition zone between the two, where the upper levels become "the freshwater zone or lens".

[95] On Diego Garcia, adjacent to the historic cemetery, a slab for exsanguinating bodies before they were placed in shallow graves can be found. Contamination from human remains was thus reduced, although probably not to levels that would be acceptable today.

[96] Construction includes a single-storey water treatment facility; 1,200,000 gallons per day capacity; a 25kW PV roof-mounted array; piping for Air Ops/Cantonment area connections; construction of additional raw water wells to meet the required output capacity.

[97] www.nexusenergyuk.com

[98] www.eta.co.at

[99] www.hotice.co.uk

[100] www.herz.eu

Other primary energy sources include wave, solar and fossil fuels and are discussed in Annex AI.6. Also considered Annex AI. 6 are ground source heat pumps and deep water source cooling.

Telecommunications. Sure[101] has been operating on Diego Garcia since 1982 under a BIOTA licence to provide public telecommunication services on Diego Garcia. These include international telephone, broadband internet and WiFI, GSM mobile, paging services and TV rebroadcast services. Sure International staff on Diego Garcia advised that fixed line telecommunication was unlikely to be cost effective for a user population of less than 500 people. The Diego Garcia 10-metre satellite dish/antenna would need to serve as a primary point from which signals could be transmitted to other BIOT islands with 4-metre antennae/receiving dishes and a vSAT terminal. Electric power (110v or Direct Current) would be required.

Costs will depend on many variables, including transport links for specialist service technicians to visit, but an approximate cost of £0.5 million per island would be a basic estimate for 512–2Mb broadband. Television off Diego Garcia would be more challenging and expensive. Operational costs may be estimated to be in the region of up to 20% of the capital investment cost.

Health/medical facilities. Basic medical services are provided from the Branch Health Clinic, Diego Garcia. They are a tenant command "on-board" U.S. Navy Support Facility Diego Garcia and their parent command is the U.S. Naval Hospital, Yokosuka, Japan. Because the clinic is designed and equipped to primarily treat general medical conditions, anyone requiring referral or ongoing care from cardiology, dermatology, gynecology, internal medicine, neurology, orthopedic, ophthalmology, or psychiatric specialties will not be considered suitable for this isolated duty station. As for all other facilities on Diego Garcia, international contractor costs are complex to determine, but indicative prices can be inferred by a 2007-2009 US$5.41 million contract to renovate Building 151, the Medical Clinic[102]. Annex AI.1 gives basic user charges for medical services on Diego Garcia.

Off Diego Garcia, other small island facilities would be relatively rudimentary in the first instance, with emergency transfer to Diego Garcia and then onwards to mainland care a probable scenario. Time delay and expense will be a key factor that needs to be considered with an elderly and/or very young resettlement population.

Education facilities. There are no schools in BIOT, and these facilities would have to be built. Population demographics and birth rates are key pieces of information required, as is the likelihood of attracting qualified staff to any basic service facilities. It is anticipated that primary and secondary school facilities would be required. College/university education is anticipated to be an off-BIOT mainland option.

Comparison with the provisions for other Overseas Territories is considered to be a reasonable basis for option definition and cost calculation for non-US Military contractors. On St Helena, capital costs for three primary schools (392 pupils) and one secondary school (236 pupils) were around £215k. On Montserrat, school build costs are £83.3p/Sq.ft. US Navy contractors on Diego Garcia are likely to charge significantly more than these amounts, but the standards, specifications and contracts will be different, and not directly comparable.

6.3 Summary of implications for resettlement

[101] www.sure.io (previously Cable & Wireless Diego Garcia Ltd until 19 August 2013)

[102] http://www.sanjuanconstruction.com/index.php/projects/detail/rc2_04_building_151_medical_clinic_renovation_at_the

Any cost estimate proposed is certain to attract challenge to amend sums upwards or downwards. Contractors providing extremely robust and high standard engineering services to the US Navy are likely to propose high costs, and small family businesses on, say, Mauritius, will claim to be able to build houses for a fraction of the costs being proposed. Both sets of assertions are true. The issue for this review has been to find a practical balance based on the consulted expectations of potential re-settlers, determining which elements are reasonable comparators with other Overseas Territories, and which take into account, the absence or paucity of existing supply chains against which costs can be more accurately calculated.

A key uncertainty is predicting the nature of future UK-USA negotiations over resettlement in principle, and the nature of amendments that would be required to existing service-level agreements with US NSF main contractors. At this stage, so as to not pre-judge HMG decisions, and to avoid causing nugatory work, they have not been approached to provide more precise estimates for offering BIOT Administration support-equivalent levels of service to a much larger population. Contractually and administratively that would be the simpler solution. It would, however, induce a continuous dependency, would certainly not offer environmentally sustainable solutions in the longer-term, and would not develop opportunities for entrepreneurship and greater public-private partnership.

Governance, agreement on population demographics, skill sets and training needs, and agreements on overall rights of movement on various parts of DG and the other Chagos Islands will also have a significant bearing on the overall physical security enhancements and increased security and police staffing levels that will be required. A large proportion of DG is a military operational facility with munitions, vehicular movement and marine and air deployment on a daily basis. It is always on standby-mode for major multi-battalion war intervention requirements. To add a sizeable civilian population that is unconnected to servicing those needs to that mix will result in predictable tensions and incidents. At the same time, the US NSF remains an opportunity for any nationalities willing to work at the contracting rates that are current on the island – as it has already been for a number of years.

In any event, the infrastructure options have assumed a relatively high standard of service provision – akin to mainland expectations, in the first instance, and over an initial 5 year period. Over a decade, it is expected that governance challenges will have solutions developed, and a satisfactory civilian-military modus operandi should have developed, if there is willingness to compromise. Expansion from 150-500 to a larger population (up to 1500) would involve a more nuanced and selective set of infrastructure provisions, probably with much more private sector inputs and with lessons learned from the previous five years of operation. Expansion to other islands for various economic-related activities (e.g. fishing, nature tourism) would be considered after more specific and realistic project proposals were developed on a case-by-case basis.

The text in section 6 provides a range of costs for many facets of infrastructure, and these are supplemented by eight Annexes. For the financial and economic analysis, then recommended “budget provision” figures are given for key major elements of infrastructure, and these are set out in section 7. These budget provision figures encompass the whole infrastructure development cycle, from site survey to detailed design, and from site clearance and preparation to complete installation and commissioning.

7 ECONOMIC AND FINANCIAL ANALYSIS

7.1 Introduction and overview

This chapter outlines the economic and financial assessment for the potential resettlement of the Chagos Islands based on the options outlined in section 3, namely:

- Option 1: resettlement of 1,500 Chagossians;
- Option 2: resettlement of 500 Chagossians; and
- Option 3: resettlement of 150 Chagossians.

As required, the analysis has focused on: (i) indicative estimates of the full cost of each resettlement option; and (ii) potential opportunities to establish and develop sustainable livelihoods, in terms of both income generation and sustainable lifestyles. In this context, reference has been made to other UK Overseas Territories and small island states (SIDS). The main aim of the assessment is to indicate: "….*the likelihood of the economy being financially self-sufficient and meeting prudential financial guidelines, and the timescale if this were to happen*." A prime aim is the requirement to illustrate the full cost of each resettlement option to the UK.

7.2 Data sources

The analysis is based on a number of detailed supporting annexes that assess: (i) the indicative costs in terms of the capital investment and the annual operations and maintenance costs, plus periodic capital replacement and/or refurbishment; and (ii) the potential economic development opportunities. The supporting data that underpins this financial and economic analysis covers the following:

- infrastructure costs;
- environmental impact assessment costs;
- fisheries;
- tourism;
- coconuts; and
- other resettlement-related information: indicative costs, income generation, sustainable livelihoods and financial forecasts.

7.3 Indicative cost estimates

7.3.1 Indicative capital cost estimates

The indicative capital cost estimates for each of the three options are summarised in this section.

Table 7.1 summarises the main infrastructure capital cost estimates, as follows:

- Option 1 (pop. 1,500) amounts to £370.8 million, which would include: (i) an airport (capable of handling international flights) costing approximately £125 million (52% of the total); and (ii) a breakwater/harbour facility costing approximately £50 million (13% of the total).
- Option 2 (pop. 500) amounts to £94.2 million, excluding an airport and breakwater/harbour facility.
- Option 3 (pop. 150) amounts to £54.6 million, excluding an airport and breakwater/harbour facility.

The estimates in Table 7.1 also illustrate the impact of excluding the costs of the airport and the breakwater/harbour facility: these are important, because it demonstrates the potential savings through negotiating modest shared access to the US NSFDG airfield and port facilities (cf. shared use of Wideawake Airfield on Ascension Island in the Atlantic Ocean). In the case of Option 1, such an agreement would reduce the indicative capital costs from £370.8 million to £160.8 million – a reduction of 57%.

Table 7.1 Infrastructure – indicative capital cost estimates (2014 constant prices)

Component	Indicative Capital Costs (£ million)			Distribution (%)		
	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
Total						
Transport & Sea Defences	204.0	19.0	9.5	55.0%	20.2%	17.4%
Energy	22.0	9.5	6.5	5.9%	10.1%	11.9%
Housing & Public Buildings	58.0	40.0	23.0	15.6%	42.5%	42.1%
Utilities and Services	25.0	10.0	6.5	6.7%	10.6%	11.9%
Total – Base Costs	309.0	78.5	45.5	83.3%	83.3%	83.3%
Physical Contingencies (1)	61.8	15.7	9.1	16.7%	16.7%	16.7%
Grand Total	**370.8**	**94.2**	**54.6**	**100%**	**100%**	**100%**
Estimates without Airport						
Base Costs	184.0	74.5	43.5	49.6%	79.1%	79.7%
Physical Contingencies (1)	36.8	14.9	8.7	9.9%	15.8%	15.9%
Grand Total	**220.8**	**89.4**	**52.2**	**59.5%**	**94.9%**	**95.6%**
Est. Excl. Airport & Breakwater/Harbour						
Base Costs	134.0	74.5	43.5	36.1%	79.1%	79.7%
Physical Contingencies (1)	26.8	14.9	8.7	7.2%	15.8%	15.9%
Grand Total	**160.8**	**89.4**	**52.2**	**43.4%**	**94.9%**	**95.6%**

Note: (1) Physical contingencies set at 20%.

The cost of the Environmental Impact Assessment (EIA), prior to the commencement of the prospective infrastructure construction programme(s), is also important given the environmental importance of BIOT and the significance of the MPA. The comprehensive EIA is estimated to cost £2.3 million and is the same for all three options.

Table 7.2 summarises the total indicative capital costs (infrastructure, preparation and supervision, and EIA) for each of the three options with an assumed annual phasing programme:

- Option 1 (pop. 1,500) – implementation over six (6) years, with a total indicative capital cost of £413.9 million.
- Option 2 (pop. 500) – implementation over four (4) years, with an indicative capital cost of £106.9 million.
- Option 3 (pop. 150) – implementation over three (3) years, with an indicative capital cost of £62.9 million.

Table 7.2 also summarises the potential phasing for Option 1 if the airport and breakwater/harbour are excluded. Under this scenario the total indicative capital costs would be £180.8 million i.e. 56% below the inclusive total.

Table 7.2 Total indicative capital cost estimates – annual phasing by option (£ million, 2014 constant prices)

Component	Year						Total
	1	2	3	4	5	6	
OPTION 1 (pop. 1,500)							
Preparation Costs (1)	22.2						22.2
Infrastructure Costs (2)		74.2	74.2	74.2	74.2	74.2	370.8
Construction Supervision (3)		3.7	3.7	3.7	3.7	3.7	18.5
EIA – Construction Phase	2.3						2.3
Total	**24.6**	**77.9**	**77.9**	**77.9**	**77.9**	**77.9**	**413.9**
OPTION 2 (pop. 500)							
Preparation Costs (1)	5.7						5.7
Infrastructure Costs		31.4	31.4	31.4			94.2
Construction Supervision (3)		1.6	1.6	1.6			4.7
EIA – Construction Phase	2.3						2.3
Total	**8.0**	**33.0**	**33.0**	**33.0**			**106.9**
OPTION 3 (pop. 150)							
Preparation Costs (1)	3.3						3.3
Infrastructure Costs		27.3	27.3				54.6
Construction Supervision (3)		1.4	1.4				2.8
EIA – Construction Phase	2.3						2.3

Component	Year						Total
	1	2	3	4	5	6	
Total	**5.6**	**28.7**	**28.7**				**62.9**
OPTION 1 (pop. 1,500) – excluding airport and breakwater/harbour							
Preparation Costs (1)	9.6						9.6
Infrastructure Costs		32.2	32.2	32.2	32.2	32.2	160.8
Construction Supervision (3)		1.6	1.6	1.6	1.6	1.6	8.0
EIA – Construction Phase	2.3						2.3
Total	**12.0**	**33.8**	**33.8**	**33.8**	**33.8**	**33.8**	**180.8**

Notes: (1) preparation costs set at 6% of infrastructure costs; (2) incl: airport & breakwater/harbour; and (3) construction supervision set at 5% of infrastructure costs.

It is also useful to illustrate the capital costs per head under each option. These are summarised in Table 7.3. For total costs, the figures are as follows:

- Option 1 (pop. 1,500) – estimated costs range from: (i) £276,000 per head for all capital cost components; (ii) £165,000 per head, excluding the airport; and (iii) £121,000 per head, excluding the airport and the breakwater/harbour. These results indicate the significant savings if access to the airfield and port facilities on Diego Garcia could be negotiated.

- Option 2 (pop. 500) – estimated costs range from £203,000 to £214,000 per head.

- Option 3 (pop. 150) – the smallest resettlement option results in the highest unit costs of £402,000 to £420,000.

Table 7.3 Indicative capital costs – per head by option (£ 000, 2014 constant prices)

Component	Infrastructure Costs			Total Costs (1)		
	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
Population	1,500	500	150	1,500	500	150
Costs per Head						
Total	247	188	364	276	214	420
Total – Excluding Airport	147	179	348	165	203	402
Total – Excl. Airport & Breakwater/Harbour	107	179	348	121	203	402

Note: (1) Incl: (i) preparation and construction supervision costs; & (ii) EIA costs – construction phase.

7.3.2 Indicative annual recurrent costs

The indicative estimates of annual recurrent costs are summarised in Table 7.4, covering; (i) operation and maintenance of the infrastructure; and (ii) annual environmental monitoring and evaluation. Estimates of the annual operating and maintenance costs for the infrastructure components are based on standard percentages of the capital cost estimates – ranging from 3% p.a. for energy transmission and distribution, to 5% p.a. for potable water

and wastewater facilities, 8% for diesel generators and 10% for support service equipment. These estimates include allowances for salaries/wages, repairs and maintenance, fuel and spares. However, the annual recurrent costs for environmental monitoring and evaluation are estimated to be the same for all three options.

The resulting estimates are as follows:

- Option 1 (pop. 1,500) – estimated costs range from: (i) £21.5 million p.a. to cover all components; (ii) £11.5 million p.a., excluding the airport; and (iii) £9 million p.a., excluding the airport and the breakwater/harbour.
- Option 2 (pop. 500) – estimated costs range from £6 to £6.3 million p.a.
- Option 3 (pop. 150) – estimated costs range from £4.5 to £4.7 million p.a.

It should be noted that the estimated environmental monitoring and evaluation costs amount to a significant proportion of the annual recurrent estimates.

Table 7.4 Indicative estimates of annual recurrent costs by option (£ million, 2014 constant prices)

Component	£ million			Distribution (%)		
	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
Total						
Infrastructure						
• Transport & Sea Defences	14.1	1.2	0.6	66%	19%	13%
• Energy	1.3	0.6	0.5	6%	10%	11%
• Housing & Public Buildings	2.7	1.8	1.1	12%	28%	23%
• Utilities and Services	1.2	0.5	0.3	6%	8%	6%
Sub-Total Infrastructure	19.3	4.1	2.5	90%	65%	53%
Environmental Monitoring & Evaluation	2.2	2.2	2.2	10%	35%	47%
Grand Total	**21.5**	**6.3**	**4.7**	**100%**	**100%**	**100%**
Estimates Without Airport						
Infrastructure	9.3	3.8	2.3	81%	63%	51%
Environmental Monitoring & Evaluation	2.2	2.2	2.2	19%	37%	49%
Total – Without Airport	**11.5**	**6.0**	**4.5**	**100%**	**100%**	**100%**
Est. Excl. Airport & Breakwater/Harbour						
Infrastructure	6.8	3.8	2.3	76%	63%	51%
Environmental Monitoring & Evaluation	2.2	2.2	2.2	24%	37%	49%
Total Excl. Airport & Breakwater/Harbour	**9.0**	**6.0**	**4.5**	**100%**	**100%**	**100%**

7.3.3 Periodic capital replacement and refurbishment costs

In economic and financial assessments, it is also standard to include allowances for periodic capital replacement and refurbishment costs. At this early stage of the investigations, these costs have been broadly estimated at 10% of the infrastructure capital costs every 10 years. The resulting estimates are as follows:

- Option 1 (pop. 1,500) – estimated at: (i) £37 million to cover all components; (ii) £22 million, excluding the airport; and (iii) £16 million, excluding the airport and the breakwater/harbour.

- Option 2 (pop. 500) – estimated at £9 million.

- Option 3 (pop. 150) – estimated at £5 million.

More detailed estimates would be defined at the stage of detailed design and final evaluation.

8 COMPARISON OF RESETTLEMENT OPTIONS

8.1 Choice of resettlement location

A summary evaluation and comparison of island options from an environmental perspective is shown below. This is based on the comprehensive analysis in section 5. In the event of resettlement, Diego Garcia is the most suitable location, with a median rank score of 1 and having a rank score of '1' for thirteen out of eighteen environmental factors assessed[103]. The suitability of Diego Garcia over Ile du Coin and Boddam also emerged from the questionnaire surveys described in section 3. In the main, respondents did not consider other islands suitable for re-settlement, especially as historically they had not supported permanent communities, apart from for example as leper colonies[104].

Table 8.1: Summary comparison of Diego Garcia, Ile du Coin and Boddam as locations for resettlement

Environmental factor	Diego Garcia	Ile du Coin	Boddam
	Rank score *(1 = most suitable or least risky island option; 3 = least suitable/most risky island option)*		
1. Carrying capacity, life support systems (self-sufficiency)			
Rainfall	3	1	2
Sustainable aquifer yield	1	2	2
Soil quality and agro-forestry potential	1	2	2
Coral reef fish abundance	3	1	2
Sea cucumber abundance	1	2	2
Food from local or external sources (transport)	1	2	2
Building materials from local or external sources	1	2	2
Previous human population size and estimated current carrying capacity	1	2	3
2. Other natural assets and environmental significance			
Naturalness	1	2	2
Scientific importance for research and monitoring	1	2	2
International significance	1	2	2
3. Impacts of environment on resettlement - climate change and other factors (atoll robustness and stability)			
Sea level rise and coastal intrusion	3	1	1

[103] However, it is noted that Diego Garcia has a rank score of '3' for three environmental factors, whereas Ile du Coin has a rank score of '3' for two environmental factors and Boddam for one environmental variable. Nevertheless, this difference is very marginal.

[104] Eagle Island and Egmont atoll were mentioned as possibly suitable for a temporary limited scientific research station and Egmont for an eco-village; see Section 4.

Environmental factor	Diego Garcia	Ile du Coin	Boddam
Tectonic movements	2	2	1
Extent of atoll enclosed by islands and reef flats	1	3	2
Island size	1	2	2
Approach and ease of access	1	3	1
4. Potential of natural resources for economic activities			
Ecotourism value of fishing and coral reefs for diving	3	1	1
Ecotourism value of island for land and inshore recreation	1	2	2
Median ranking score	*1*	*2*	*2*
Frequency of '1' scores	*13*	*4*	*4*
Frequency of '2' scores	*1*	*12*	*13*
Frequency of '3' scores	*3*	*2*	*1*

As noted, the most realistic initial resettlement options for Diego Garcia is 'modern' (with limited initial infrastructures and facilities) and for the outer islands (e.g. Ile du Coin or Boddam) the probable option is basic standards and eco-features. The anticipated impacts from construction, infrastructures and operations are assessed comparatively in section 5, together with the expected effects of fishing and other human activities. The resettlement option for Diego Garcia would be significantly less invasive environmentally for BIOT than the option advocated for the outer islands. The reasons for this may be summarised as follows:

- While eastern Diego Garcia, including the proposed (eastern) area for inhabitation by Chagossians in the event of resettlement, is an internationally significant wetland area (Ramsar site) and contains an Important Bird Area, this island lies outside the large Chagos No-Take MPA – which is of even greater global reknown.

- Diego Garcia already has an airport and port, as well as many other facilities. Being already significantly impacted, the island might be viewed as a 'sacrificial environmental anode'[105].

- In contrast, Ile du Coin and Boddam are remote, inhospitable islands, where all infrastructures and facilities would need to be established in the event of resettlement or tourism; this would be costly environmentally as well as economically. Construction of a port and/or airport would be extremely invasive and create major environmental injuries to the coral reefs and interdependencies.

- Development impacts on one or more outer atolls could also extend to the Chagos MPA, threaten its ecological integrity and diminish the utility of this asset as a global reference site for environmental monitoring and in other ways.

Although a 'modern' lifestyle (with limited initial infrastructures and facilities), on Diego Garcia, would seem the most appropriate initial resettlement option from comparative

[105] A key assumption is that these and other major facilities would be accessible by returning Chagossians. Otherwise, the island would incur substantial additional environmental impacts following resettlement.

environmental evaluations, challenges in the event of resettlement are substantial whichever island and development option/options are selected. This was also an important point emerging from the environmental survey. The reasons for this include the vulnerability of coral islands to natural processes, development impacts and disturbances from sea level rise, coastal erosion and overtopping (see also section 5). Their dynamics are complex but still poorly understood for Chagos. In the event of resettlement, maintenance of coral reef health will be paramount, especially against a background of increasing ocean acidification and potential undermining of reef resilience from development pressures.

8.2 Environmental considerations

Potential or expected environment impacts from construction and infrastructures for different resettlement options in BIOT, with and without mitigation, are illustrated below.

Table 8.2: Potential or expected environment impacts from construction and infrastructures for different resettlement options in BIOT, with and without mitigation.

	Impact with no or little mitigation (0 - none, + little/some, ++ moderate, +++ heavy impact)		Notes and possible mitigation effects (on-going monitoring essential)
	Option 3 (small-scale resettlement) and Option 2 (medium-scale resettlement)	Option 1 (Large-scale resettlement)	
Overall impact on Chagos protected area(s)	+/++ Diego Garcia outside Chagos No-Take MPA; potential impact on Ramsar site and Important Bird Area Construction impacts much lower than for Ile du Coin or Boddam, as less overall need for new infrastructures and facilities	++/+++ Threat to integrity of MPA; reduced fish production, reef quality and other assets; undermining of global reference sites for monitoring climate change and other disturbances	Impacts less if strict adherence to MPA and BIOT environmental regulations; quotas on number of islands resettled and resource-use/loss levels permitted will help reduce MPA damage depending on population size
Port/access facilities (jetties, piers, groynes and breakwaters)	+ Some impact from new facilities in east; assumed resettled population has access to these facilities in west	+++ Direct loss of coral reefs and island habitats from dredging, infill and sedimentation; major threat to resilience of island against erosion, sea level rise and other impacts	Some reduction if best construction practices followed, but major impacts to reefs and islands unavoidable
Airport	0 Access to existing airport for any resettled population assumed	+++ Impacts as for ports (above), but more substantial, long-lasting and irreversible	As for ports (above); severe erosion of coral reef quality and ecosystem services unavoidable

	Impact with no or little mitigation (0 - none, + little/some, ++ moderate, +++ heavy impact)		Notes and possible mitigation effects (on-going monitoring essential)
	Option 3 (small-scale resettlement) and Option 2 (medium-scale resettlement)	Option 1 (Large-scale resettlement)	
Roads	+ Some loss of vegetation/habitat and bird life from new roads; assumed resettled population has access to existing roads	++ Significant loss of vegetation/habitat and bird life from new roads following clearance of vegetation for access	Some amelioration of impacts if BIOT environmental regulations followed and construction of infrastructure and facilities follows international best practice; minimise use of local coral and sand as building materials for all construction
Housing	++ New buildings needed; types of impacts (habitat loss etc.) as for roads above	++ New buildings and facilities needed; types and severity of impacts as for roads above; non-sustainable use of coral, sand and timber as construction materials	
School			
Clinic			
Administration buildings			
Power generation	+/++ Habitat loss etc, as for roads (above); assumed some use of existing facilities		
Telecommunications			
Domestic water, sanitation and waste facilities	+ Some habitat loss from construction effects		
Small tourism resorts	+ Assumed no or limited demand for tourism	++ Design, size/area of units and number of units determine overall impact	Advanced and innovative design to help reduce impact, but some habitat/wildlife loss following construction unavoidable
Shore defences (against sea level rise, erosion) - precautionary principle	+/++ Boulders/defence needed for any resettlement in eastern DIEGO GARCIA; some environmental disruption of island/sea interface	+/++ Boulders/defence needed for any resettlement in outer islands; some environmental incursion at island/sea interface	Careful planning and best practice to help minimise impact; minimal removal of Scaevola/vegetation – which affords some natural coastal defence

Potential or expected environment impacts from operations and human activities for different resettlement options in BIOT, with and without mitigation are shown the second summary table below.

Table 8.3: Potential or expected environment impacts from operations and human activities for different resettlement options in BIOT, with and without mitigation.

	Impact with no or little mitigation (0 - none, + little /some, ++ moderate, +++ heavy impact)		Notes and possible mitigation effects (on-going monitoring essential)
	Option 3 (small-scale resettlement) and Option 2 (medium-scale resettlement)	Option 1 (Large-scale resettlement)	
Overall impact on Chagos protected area(s)	++ Diego Garcia outside Chagos No-Take MPA; potential impact on Ramsar site and Important Bird Area. Impacts of operations & activities moderate and lower than for Ile du Coin or Boddam, as less overall need for	++/+++ Reduced fish production & reef quality; undermining of global reference sites for monitoring climate change and other disturbances	Impacts of operations & activities reduced if strict adherence to MPA and BIOT environmental regulations – e.g. prevent exceedances of contaminant concentrations
Solid waste	+/++ Hazardous materials problematic for human & environmental health; current levels dealt with adequately	++/+++ Potential major problem on outer islands; impacts as for Diego Garcia resettlement; macro- and micro-plastics densities high	Crushers, incinerators and removal of waste materials help alleviate problems; replication of beach clean-up of plastics on Diego Garcia needed on outer islands
Sedimentation (*more a problem from construction)*	+/++ From various activities, including shipping; can result from non-sustainable agro-forestry (on any of the islands)	+++ Creation of access routes for port/harbour by blasting of reefs for channels particularly harmful	Some amelioration of damage through careful construction and operations practices – including sustainable agro-forestry
Sewage, including possible contamination of aquifer	++ Health implications and harmful environmental effects from nutrients & pathogens (eutrophication, algal overgrowth on coral reefs)		Advanced technologies for sewage treatment; discharge pipes long enough to bypass reef slope and limit impact;
Pesticides, herbicides and other contaminants,	+ Potential entry into aquifers and also the marine environment	++ Reports of copper (fungicide) residues in aquifer during previous occupation of outer islands	
Agroforestry	+/++ Soils fragile and fertility easily lost through non-sustainable agriculture or agroforestry; limited buffering capacity of soil can lead to aquifer contamination; potentially non-sustainable use of aquifer water		Impact reduced by limiting infrastructure development and ground compaction, plus other measures
Sustainability of fishing	+++/++ Impairment of fish populations a major concern; already evident for coral fish in Diego Garcia following recreational fishing (see also section 2.4)		Strict adoption of catch quotas & fishing area restrictions; population depletion less likely if

	Impact with no or little mitigation (0 - none, + little /some, ++ moderate, +++ heavy impact)		Notes and possible mitigation effects (on-going monitoring essential)
	Option 3 (small-scale resettlement) and Option 2 (medium-scale resettlement)	Option 1 (Large-scale resettlement)	
			fish also imported (see also section 2.4)
Diving and snorkelling	**+** Damage may increase if resettlement, adding to pressures from existing recreational activity	++/+++ Increased impacts if tourism develops; coral breakage from snorkelling, trampling & scuba diving expected	Strict enforcement of MPA and BIOT regulation may help reduce reef injury
Boating, fishing and other effects of tourism	+ As above	++ As above; anchor damage to coral and fishing & collecting potentially serious impacts	Monitoring & enforcement of regulations will help reduce damage

8.3 Comparative costs of resettlement options

Section 7 provides a detailed description of the indicative costs associated with each resettlement option. These costs are summarised in the table below, by way of comparison.

	Option 1	Option 2	Option 3
Indicative capital cost estimates	£370.8m	£94.2m	£54.6
Indicative capital costs, with assumed annual phasing of implementation	£413.9 million over 6 years	£106.9 million over 4 years	£62.9 million over 3 years
Capital costs per head of population	From: (i) £276,000 per head for all capital cost components; (ii) £165,000 per head, excluding the airport; and (iii) £121,000 per head, excluding the airport and the breakwater/harbour.	From £203,000 to £214,000 per head	From £402,000 to £420,000 per head
Annual recurrent costs	From: (i) £21.5 million p.a. to cover all components; (ii) £11.5 million p.a., excluding the airport; and (iii) £9 million p.a., excluding the airport and the breakwater/harbour.	From £6 to £6.3 million p.a.	From £4.5 to £4.7 million p.a.
Periodic capital replacement and refurbishment costs	Estimated at: (i) £37 million to cover all components; (ii) £22 million, excluding the	Estimated at £9 million	Estimated at £5 million

	Option 1	Option 2	Option 3
	airport; and (iii) £16 million, excluding the airport and the breakwater/harbour.		

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