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PIONEER CONSULTING
SUBSEA CONNECTIVITY EXPERTS

Cayman Islands Government Submarine Cable

Outline Business Case

20 October 2022

Date

20 October 2022

Parties to this Report

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[redacted]

Dear [redacted],

We have pleasure in enclosing a copy of our Outline Business Case for the Cayman Islands Government's submarine cable project. This document (the **Report**) has been prepared by Grant Thornton UK LLP (Grant Thornton) for Cayman Islands Government (the **Addressee**) in connection with the Cayman Islands Government Submarine Cable project (the **Purpose**). We have been supported by our subconsultant Pioneer Consulting, who have provided technical and operational advice in relation to the production of the Outline Business Case.

We stress that the Report is confidential and prepared for the Addressee only. We agree that an Addressee may disclose our Report to its professional advisers in relation to the Purpose, or as required by law or regulation, the rules or order of a stock exchange, court or supervisory, regulatory, governmental or judicial authority without our prior written consent but in each case strictly on the basis that prior to disclosure you inform such parties that (i) disclosure by them is not permitted without our prior written consent, and (ii) to the fullest extent permitted by law we accept no responsibility or liability to them or to any person other than the Addressee.

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Scope of work and limitations

Our work focused on the areas set out in our contract of engagement dated 31st March 2022.

Forms of report

For your convenience, the Report may have been made available to you in electronic as well as hard copy format, multiple copies and versions of the Report may therefore exist in different media and in the case of any discrepancy the final signed hard copy should be regarded as definitive.

General

The Report is issued on the understanding that the management of the Cayman Islands Government have drawn our attention to all matters, financial or otherwise, of which they are aware which may have an impact on our Report up to the date of signature of this Report. Additionally, we have no responsibility to update this Report for events and circumstances occurring after this date.

Contacts

If there are any matters upon which you require clarification or further information please contact me

[redacted]

Grant Thornton Specialist Services (Cayman) Limited

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A. Introduction and the Case for Intervention

This document is the Outline Business Case (OBC) for the Cayman Islands Government's submarine cable project. It is the second of the three business case stages for the project. The first stage, the Strategic Outline Case, was produced in 2021 by the CIG, and Cabinet agreed that the project should proceed to Outline Business Case stage. Following approval of this OBC, the project will move into the development and procurement stage: the Full Business Case (also sometimes known as the 'Final' Business Case). This will present decision-makers with a procured outcome with firm costs for approval at the conclusion of the development and procurement stage.

The case for intervention

The Cayman Islands enjoys a vibrant and modern economy, to which international data connectivity is crucial. In 2021, the Cayman Islands had a GDP of approximately KYD$4.3 billion (equivalent to approximately USD$5.2 billion[1]), and is now expected to be recovering quickly from the Covid-19 global pandemic. The international financial and insurance sector is the largest contributor to GDP, making up approximately 33% of GDP[2].

The strength of the Cayman Islands' economy, as well as its internationally connected and increasingly digitally-enabled nature, means that certainty, resilience and adequacy of future international digital connectivity is critical: high capacity, reliable and affordable telecommunications services can be seen as the life-blood of any modern economy, and are critical to adapting to the global digital transition. They are fundamental components of economic and social activity across the Cayman Islands, supporting citizens in their education, healthcare, entertainment, work and social activities. They can support improved productivity, investment, trade and consumer welfare.

International connectivity is also a fundamental component of the government's strategy to focus and strengthen the digital economy, and to build a technology sector that supports the global technology ecosystem.

There are currently two subsea cables that connect the Cayman Islands into the international network of telecommunications systems: MAYA-1 and CJFS.

- **MAYA-1** is a major cable system in the region that provides subsea connectivity to the Cayman Islands. It began service in 2000, and spans 4400km from [redacted] to Columbia with a landing station in Half Moon Bay on Grand Cayman, as well as landing stations in Mexico, Honduras, Costa Rica, Panama and Colombia. It is owned and operated by a consortium. The landing party in the Cayman Islands, Flow, is owned by Cable and Wireless (C&W).
- The **Cayman-Jamaica Fibre System** (CJFS) is a subsea cable connecting Grand Cayman and Cayman Brac to Jamaica, which began service in 1997. It is repeaterless, meaning that it is technically less complex than MAYA-1. It is 870km long, and owned by C&W Networks.

Both systems are aging, and the Cayman Islands Government (CIG) has no certainty or control with regard to the future of either of the existing cables. The CIG considers subsea cables critical national infrastructure, and the lack of certainty about their future introduces various risks to the islands, and represents a threat to the islands' future.

Competition

In many areas of the world, the market for international connectivity supports multiple international cables, which can lead to highly competitive markets for international connectivity. Where it exists, this kind of competition can lead to competitive pressure on pricing, high quality customer service, and innovation and flexibility from suppliers. This, in turn, can support a dynamic and thriving digital economy, with ongoing inward investment stimulating the economy, and citizens benefiting from the advantages that connectivity can bring across education, healthcare, entertainment and other sectors.

[1] Annual Economic Report 2021, The Economics and Statistics Office of the Cayman Islands Government, August 2022. Conversion to USD assumes an exchange rate of KYD$1 = USD$1.20.
[2] Table 3.2, Annual Economic Report 2021.

There appears, however, to be a lack of competitive tension in the market for international connectivity from the Cayman Islands. Specifically, the barriers to entry with regard to new international connectivity — including, primarily, the high capital costs associated with new infrastructure — appear to be too high to support meaningful competition in those markets given the relatively low number of consumers (and hence demand) on the islands. The incumbent operator therefore appears to benefit from a natural monopoly.

Natural monopolies are characterised by a market where the largest supplier in an industry holds advantages over competitors, often because of the scale of barriers to entry, which may lead to suboptimal outcomes for consumers and other businesses. Without government intervention, such markets are not subject to significant pricing pressure as would occur in a competitive market. Typically, therefore, governments seek to mitigate the effects of such markets on consumers through regulation, where regulators often have the power to cap prices or the level of return granted.

The existence of a natural monopoly for international digital connectivity on the Cayman Islands means that a new private sector competitor landing an international cable in the Cayman Islands while the existing infrastructure is operative would be unlikely to be able to compete with the incumbent (who benefits from existing infrastructure) on price, given the likely need of a new private sector competitor to recover the capital invested and a commercial rate of return. This situation would change, however, in the event that one of the two existing systems were decommissioned. Analysis by industry experts Pioneer Consulting of the remaining lifetime of the MAYA-1 infrastructure (which is set out in the Management Case of this OBC) indicates that MAYA-1 should be seen as only a near-term solution and planning should not assume that it will continue to be available for use in anything other than the immediate short term.

The reason that the situation would change, and that a new private sector competitor might be able to compete with the incumbent in the event that one of the two existing systems were decommissioned, is that purchasers of digital capacity typically purchase ‘redundancy’, as explained below.

Purchasers of digital connectivity typically purchase not only the capacity that they forecast that they will need, but also capacity on alternative routes so that should one route fail (as a result of a cable fault, for example), connectivity is not lost. This is known as purchasing ‘redundancy’. In the event that one of the two existing subsea cables were decommissioned, it is likely that demand on a third cable would be substantial, as it would represent the only way in which purchasers could buy redundancy. However, relying on the decommissioning of an existing cable would represent a significant assumption for a commercial developer, and to date no third-party developer has entered the market.

While various new subsea cables have been discussed and proposed, there appears, therefore, to be no certain prospect of a private sector operator bringing competition to the Cayman Islands. This situation represents market failure, as it means that the people of the Cayman Islands are not certain to benefit over the long term from the benefits that competition can typically bring, including reductions in pricing, innovation, service flexibility and high-quality service levels.

In order to test this analysis, financial modelling set out in the Financial Case of this Outline Business Case (OBC)[3] estimates the financial return that a purely private sector operator would contemplate when considering whether to bring a cable to the Cayman Islands. On the basis of the assumptions explained in the Case (including that one of the existing cables is decommissioned in [redacted]), the analysis finds that, were a private sector operator to invest to bring a spur from a third-party cable to the Cayman Islands, it would need to charge a price of around [redacted] per 10Gbps per month[5] in order to recover its investment, pay an assumed [redacted] cost of capital, and service the ongoing operations and maintenance requirements of the cable. (This makes the critical assumption that the new cable receives [redacted] share of linear capacity soon after construction, as a result of the

[3] See Financial Case Scenario 2.
[4] All prices are stated in US Dollars unless otherwise indicated.
[5] All prices for international connectivity discussed in this OBC, unless otherwise indicated, are quoted on present-day equivalent basis (on the basis that the price declines to neutralise the revenue impact of background demand growth) and are expressed in USD per 10Gbps per month, which is the normal industry approach to pricing capacity.

assumption that one of the existing systems is decommissioned.) One way to assess whether this price would be competitive is to compare it to existing pricing.

Establishing the current market price for international subsea capacity definitively is not straightforward and stakeholder interviews suggest that the rate experienced in the market might vary significantly, as a result of diverse commercial arrangements. However market intelligence suggests that the potential future rate of [redacted] is more expensive than the rate some customers may experience currently, which might be around [redacted] or lower in some cases. This is consistent with the assessment set out in Scenario 1 of the Financial Case that a return could be made on residual operations and maintenance costs of these existing cables at a significantly lower price point by the existing owner. While both of the existing cables are operative, there therefore appears no financial case for a private sector operator to bring a new cable to the Cayman Islands, as they would be unlikely to be able to sell either principal or redundancy backup capacity on it at the price needed to recover the cost of their investment. The financial case for a private sector provider would only appear to become viable at the point that one of the existing cables is decommissioned, when any customer seeking to guarantee both principal and backup international connectivity would automatically have to transact with them.

[redacted] This implies either unnecessarily high prices for international connectivity in the Cayman Islands, or failure of new cable providers and this risk might deter some or all new providers.

In the scenario where only a single, new private sector provider was to land a new cable, and one of the existing cables be decommissioned, the Cayman Islands would risk being subject to the undesirable aspects of a dominant provider, including potentially high prices to consumers and lack of customer focus, flexibility and innovation. In this situation, the landing party of the cable may also have a natural advantage on-island over other on-island telecommunications providers, which would be required to transact with them for a service that is critical for their business. This appears to back up CIG's initial diagnosis of market failure with regard to international connectivity.

While bringing competition to the market for new subsea cables could support better competition for digital services on the Cayman Islands, the cost of subsea connectivity appears to be a small element of the price that is ultimately charged to consumers such as households and businesses. There are multiple other considerations. On-island consumer prices are calibrated in view of a wide range of factors, including the need to invest in and maintain on-island infrastructure, and provide customer service, as shown in Figure 1 — which shows that the costs of international connectivity to on-island telecoms providers could make up approximately [redacted] or less of overall charges to broadband and mobile internet users even in future and potentially less in many cases currently, as explained below.

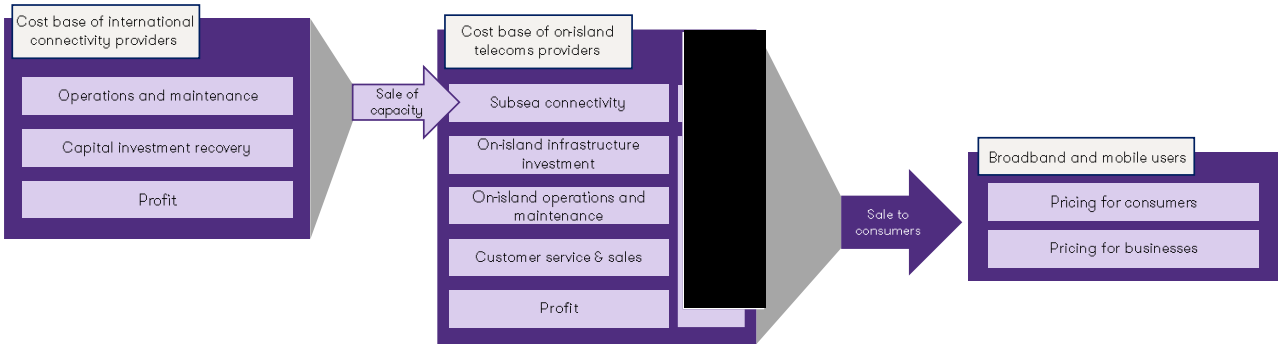

Figure 1: subsea connectivity costs in wider commercial context, with estimated percentages of cost base

Part of the reason that the costs of subsea connectivity to on-island telecoms providers are understood to be a relatively low percentage of their cost base relates to the fact that it is understood that telecoms providers do not buy from cable providers the full level of capacity that they sell onwards to consumers, because all consumers do not typically use all of the bandwidth available to them at the same time. In other words, while domestic consumers who buy a 1Gbps connection may *at some times* use 1Gbps, not all customers who buy a 1Gbps connection will use 1Gbps at the same

time. Therefore the total capacity required by the telecom provider is less than the capacity that it sells onwards to consumers. (A comparison may be drawn to banks, which may not typically hold the full value of customers' cash deposits in cash, because they do not anticipate that all customers will withdraw their funds at the same time.)

The estimate presented above is derived as follows:

- it is assumed that in a large customer base with connections offering 1Gbps (for which the domestic price is typically around [redacted]), the average demand for connectivity from each customer at any moment in time is that required to stream an HD video — approximately [redacted] — which is only approximately [redacted] of the maximum capacity of each connection
- this would mean that each Gbps of subsea connectivity could serve approximately [redacted] consumers, each of whom pays for a 1Gbps connection — bringing revenue of [redacted] if a $250 per connection price is assumed
- later in this Financial Case, an illustrative estimate is made of the future cost for linear, international connectivity (i.e. without any redundancy purchased via multiple cables) without CIG intervention. This estimate is [redacted] per month per 10Gbps.
- if the price of subsea connectivity is estimated to cost e.g. [redacted] per month per 10Gbps of *linear* capacity, or [redacted] with redundancy via two connections, then the cost of providing connectivity for 200 connections offering 1Gbps is one tenth of [redacted]
- [redacted]
- Some purchasers of subsea connectivity currently appear to be experiencing significantly lower costs than [redacted] per 10Gbps per month via existing infrastructure.

Because subsea connectivity is understood to represent a relatively low proportion of an overall cost base for some on-island providers, the potential *direct* impact of a new CIG-sponsored subsea cable on consumer and business costs for broadband and mobile internet is likely to be [redacted] limited. In practice though, the situation is complex and may be different for different parts of the market, Furthermore, international connectivity costs might make up a higher proportion of *marginal* additional costs for providing increased capacity. Prices may therefore be reduced as a more complex result of improved competition for digital services in the Cayman Islands and this, combined with ensuring there is modern, reliable infrastructure with high capacity and speed may also underpin inward investment to the Cayman Islands economy - including potentially in new industry sectors. Although it is not possible to make confident, analytical estimates of this type of economic benefit, ensuring that a CIG intervention in the market improves the cost of future international connectivity remains consistent with CIG's objectives.

Resilience

[redacted]

The Economic Case of this OBC estimates the economic value to the Cayman Islands of improved resilience, by assuming that a new cable will avoid one fault every [redacted], and that these faults would take 10-14 days to repair.

In 2020, the Cayman Islands had a GDP of $4.9 billion, which is equivalent to a daily GDP figure of $13.4 million. Assuming that all goods and services sectors will be impacted in some way by network disruptions, this could translate to a potential daily GDP impact from disrupted connectivity of $288,000 in 2020. Assuming a 2.7% annual GDP growth rate[6], over a 28-year time period, this would mean that the Cayman Islands could experience a loss of $59.6 million. Applying a [redacted] discount factor provides a total discounted benefit of [redacted]

The Economic Case estimates that in the counterfactual scenario where there is no private provider replacing MAYA-1, both options appraised achieve monetised value for money with BCRs of [redacted] (for the [redacted] option) and [redacted] (for the illustrative spur option). This shows that economic benefits outweigh the economic costs to government for all options, although this excludes a wide range of benefits which it has not been possible objectively to monetise.

This means that the benefits of resilience, and the associated BCRs, may in fact be considerably higher than those stated above. Sensitivity analysis also provided in the Economic Case illustrates

[6] Note that this is the average GDP growth rate of Cayman Islands between 2010 and 2019 and is likely to vary. 2020 was excluded due to the adverse impacts of Covid. This is also likely to be an underestimate as it does not include the bounce back of GDP as a result of economic recovery post-Covid.

[7] A discount rate of [redacted] has been assumed. Further information on the economic modelling conducted is described in detail in the Economic Case of this OBC.

that a disproportionate impact of connectivity disruption on the 'Information and Communications' and 'Financial and Insurance Services' sectors could lead to the total impact on GDP (discounted) could be between $62 million and $102 million.

In addition to the direct resilience effects described above, second order effects can also be identified which may further contribute to the economy of the Cayman Islands:

- First, a new cable may improve the public perception of the Cayman Islands as a digitally-enabled economy, and improve stakeholders' perception of the level of ICT services in the country — which may contribute to inwards investment.
- Second, the fact that CIG has intervened to ensure the continued connectivity in the face of uncertainty may lead to a market assumption that the government would intervene again in the future, should the Cayman Islands' future connectivity again be at risk. This assumption may also support further inward investment.

Together, the principal and two second-order effects of improvement resilience will act to support the Cayman Islands as a digitally-enabled economy, and is likely to increase its attractiveness for domestic and international business investment. These effects might be secured early by making publicly clear the government's intentions with regard to digital connectivity as soon as possible.

In summary, there is a valid argument for CIG to intervene to provide new international subsea connectivity for the Cayman Islands, in order to assure and deliver resilience for the country's international connectivity. This is because the decommissioning of an existing cable before its replacement by an entirely commercial enterprise would lead to a situation where the Cayman Islands' international connectivity possesses no resilience to system faults. CIG commissioning a new cable could assure the continuity of at least Level 1 resilience. In seeking to assure national resilience, CIG may reasonably want to act in the way that has the best prospect of improving competitiveness in the Cayman Islands communications market, including by minimising the possibility of a future market participant controlling the market for international connectivity.

On the basis of this argument, there appears to be a strong case for CIG to continue to work to intervene to deliver new connectivity. As the potential entrance of a new private sector provider to the market, and the timing involved, is uncertain, the monetised analysis in the Economic Case of this OBC considers the effects of a new cable on resilience.

Recommendation 1: that CIG proceeds with the project to secure new international subsea cable connectivity, making its intentions publicly clear.

B. How to intervene

As described later in this Executive Summary, and explained in detail in the Strategic Case of this OBC, there are two broad categories of infrastructure options that could be built to deliver the international connectivity that the Cayman Islands needs. These categories can be termed 'self-build' options, whereby CIG procures an entirely new subsea cable all the way to a significant, international network access point (NAP); and 'spur' options, where CIG enters into a commercial agreement with a third-party cable in the region to provide a connection to the Cayman Islands.

Whichever of these two approaches CIG decides to take (the options are discussed further below and in the Commercial Case), an entity to act as a technically and commercially-competent 'client' to procure and manage the cable on behalf of CIG will need to be identified. The principal roles of the Client include:

- development of a technical specification for the infrastructure in line with CIG's requirements and budget;
- securing CIG approval for the next stage of the Business Case process (a 'Full' or 'Final' Business Case) for the project, setting out the detailed commercial and management approach to be used;
- procurement of cable infrastructure in line with CIG's requirements and budget;
- securing CIG approval for contract signature;

- managing supplier relationships;
- acting as landing party for the new cable, including by securing the necessary permits and licences from authorities such as OfReg and the Department of Environment;
- developing and implementing a robust commercial proposition for the ongoing commercialisation of capacity on the asset, including through seeking overseas revenue streams;
- managing the operations, maintenance and repair of the cable asset in-life;
- on an ongoing basis, monitoring the international connectivity of the Cayman Islands and advising CIG of any further interventions necessary to maintain the requisite level of capacity and resilience; and
- on an ongoing basis, identifying, monitoring and mitigating risks to the cable and regularly reporting to CIG on the risk landscape.

The Commercial Case analyses a number of possible forms that the 'Client' entity described above could take. These include a CIG-owned company, a Public-Private Partnership and a Joint Venture, as well as approaches that transfer risk away from a purely commercial operator such as a usage or revenue guarantee.

The Commercial Case concludes that all options, with the exception of the 100% CIG-owned company, fail to deliver at least one of CIG's core objectives. The principal issue with any private sector party being involved is that they will be primarily focused on ensuring they can generate a commercial return for their shareholders, and this may involve them requiring to control pricing or for them to hold an advantageous position in providing infrastructure to the CIG. Any such position is likely to result in CIG failing to secure maximum benefit from a new cable and could have negative impacts on the economy by appearing to provide state aid to a select commercial entity (or entities).

On the basis of the analysis set out in the Commercial Case, this OBC therefore recommends a wholly government-owned company (known throughout this OBC as 'Cable Co') is established to act as Client. Cable Co would be legally and financially distinct from the government, but controlled by and answerable to it as its sole shareholder.

The OBC recommends that a company that is separate from the government itself is established (rather than running the project from a team within government):

- formal separation from government will allow full management attention of the Client to be focused on successful delivery of the project, rather than seeking to manage a complex procurement and project management as part of a wider job and responsibilities
- separation allows clear division and accountability for funding, with a defined line between those responsible for approving expenditure (CIG, the 'Sponsor') and proposing it (Client)
- separation provides clear lines of accountability for delivery of the project
- separation may allow the company greater agility in doing business with the private sector (this may be particularly important with 'spur' options, where rapid and robust commercial negotiation may be required to secure an optimal outcome)
- standalone Client provides a vehicle for securing the necessary technical expertise that can work in a small, focused organisation and deploying it in a targeted way.

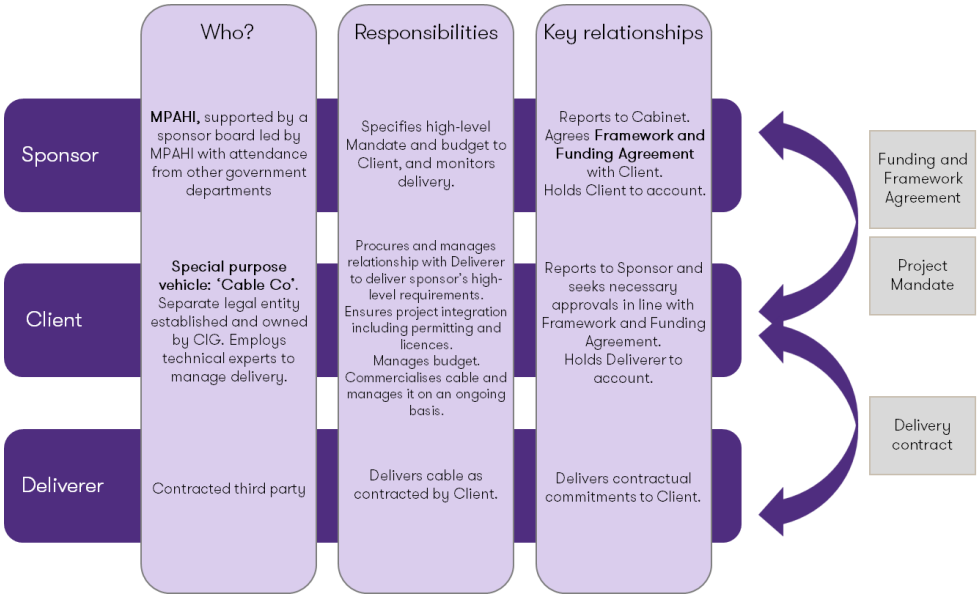

Figure 4: principal relationships and responsibilities

In order to deliver its role, the Management Case estimates that around [redacted] members of staff employed on a part time (0.5 FTE) basis will be required. The costs of these staff have been reflected in the financial modelling as set out in the Financial Case, and their assumed roles described in the Management Case. Additional people with specific technical, legal, regulatory and other expertise are likely be required in the early stages of work, in the period before the cable is brought into service.

One of the principal roles for the Client will be to undertake robust legal assurance and risk assessment throughout the project. In constructing this Outline Business Case, the project team has identified and explained where some particular areas of legal risk may lie; however, no legal advice has been sought.

For the remainder of this Executive Summary, the proposed government-owned client organisation is termed 'Cable Co'.

It would be possible for CIG to proceed with the early stages of the project (e.g. developing the technical specification) itself alongside establishing Cable Co and appointing its staff. This could help to accelerate delivery of the infrastructure, although care would need to be taken not to blur lines of accountability in the early stages. A pragmatic approach (which is described in more detail in the Management Case) could be to establish a 'shadow' Cable Co within CIG in the period before Cable Co is fully mobilised. The shadow organisation would seek to act as Cable Co as far as is possible before the appropriate formal structures and resources have been put into place.

Recommendation 2: CIG establishes and staffs a government-owned 'Cable Co' to act as Client for the project.

Once Cable Co has been established, it will be highly important that CIG maintains oversight and appropriate control of it. To achieve this, a clear 'Sponsor' should be identified within CIG. This OBC assumes that this role will be performed on behalf of CIG by the Ministry of Planning, Agriculture, Housing and Infrastructure (MPAHI), and typically the lead sponsor will be the Senior Responsible Officer (SRO) of the project.

As Sponsor, MPAHI will be responsible for ensuring that the relationship between CIG and Cable Co is clearly defined. This can best be achieved by a Framework and Funding Agreement (FFA) between CIG and the Cable Co, as explained in the Management Case. This FFA should clearly define the limits of Cable Co's autonomy, and set out clearly where and when decisions must be referred back to CIG.

MPAHI could establish a regular project Sponsor Board, to allow officials from other departments to engage effectively in the sponsorship of the project and support the SRO in his/her role as principal sponsor. This Board could effectively be developed from the existing project steering committee.

Recommendation 3: MPAHI to act as sponsor for Cable Co, supported by a cross-CIG project Sponsor Board, and to establish appropriate governance of Cable Co as described in the Management Case.

The role of Cable Co will partially depend on the nature of the infrastructure that CIG wishes it to procure. If CIG wishes to pursue a 'self build' option, then Cable Co will need to develop a technical specification and run a procurement, to establish the most economically competitive tender from different cable suppliers and award a contract to the successful bidder. If, however, CIG wishes to pursue 'spur' options, Cable Co will need to engage on a bilateral basis with developers of all credible options, and ultimately make a Direct Award to the preferred supplier.

In order to direct Cable Co, CIG must give it sufficient direction through a written Mandate. This should be a separate document from the Framework and Funding Agreement, as it concerns the proposed cable itself rather than the nature of the client organisation.

The Mandate should set out directions for Cable Co specifying what Cable Co should seek to procure, and the available budget. The Mandate should not seek to define detailed technical specifications (that is the responsibility of Cable Co), but should address high-level strategic questions such as:

- the number of connections to seek
- whether to pursue self-build or spur option(s)
- where overseas the cable(s) should land
- whether and how connectivity should be extended to Cayman Brac
- requirements around the commercialisation of new connectivity once it has been delivered.

The following section discusses the development of CIG's Mandate for Cable Co.

C. Development of CIG's Mandate for Cable Co

As described above, CIG will need to give high level instructions to Cable Co as to the nature of the infrastructure that it should procure. This is done through the Project Mandate, which should be separate from the Framework and Funding Agreement described above. This section of the Executive Summary explains the various considerations that the Cabinet of CIG will wish to consider when determining the content of the Mandate.

[redacted]

[redacted]

[redacted]

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8 [redacted]

technically simple system and is not subject to the commercial incentives on participants in a wide consortium).

It is possible that in this scenario, where MAYA-1 has been decommissioned and a new government cable constructed, a 'first' CIG-developed international cable and the signalled intent for CIG to act in the market reduces the incentive on the operator of CJFS to keep that system operational on an ongoing basis. There is a risk, therefore, that were CJFS to start incurring a high frequency of faults or require particularly costly repair, then its operator might be less likely to invest in keeping the cable operational, leaving the Cayman Islands with 'Level 0' resilience — which would be highly undesirable. While this scenario is viewed as being unlikely, it cannot be ruled out and the consequences could be highly significant and counter to CIG's project objectives.

[redacted]

There is therefore a decision for CIG's Cabinet as to whether to mandate Cable Co to pursue one or two cables. The advantages and disadvantages of building a second cable alongside the first are set out in the table below.

Table 1: advantages and disadvantages of constructing two cables simultaneously

Simultaneous construction of two cables	
Advantages	**Disadvantages**
• [redacted]) • CJFS is already 25 years old, and may need replacing within the medium term • Allows CIG to benefit from the broad range of regional private sector cable systems are currently being proposed, which may not be available in the future	• Increases costs (the extent depends on the options chosen), and may be effectively redundant in the near term if CJFS continues to operate • Sequencing the build of a second cable allows Cable Co to learn from the experience of the first cable and potentially benefit from any efficiencies identified • Sequencing the build of a second cable requires less organisational capacity in Cable Co • Provides a window of time for the private sector to build a cable to lever the Cayman Islands' new connectivity to the US, potentially allowing the Cayman Islands to act as a regional hub.

[redacted]

Infrastructure solution

There is a decision for CIG as to what type of infrastructure solution, or solutions, Cable Co should be mandated to deliver. A long-list of nineteen conceptually possible options is identified in the Strategic Case of this OBC, and a shortlist then subject to detailed analysis in the Economic Case.

In all cases, it is assumed that a connection to [redacted] is a globally significant internet exchange point and data centre [redacted] and provides highly resilient and efficient onwards connections.

The infrastructure options initially shortlisted in the Economic Case are:

- [redacted].

- [redacted]
- [redacted] In practice, however, the uncertainty as to the future delivery of any possible ‘spur’ option means that in selecting a spur option, CIG should, to ensure maximum prospects of delivery, remain relatively open as to which spur is ultimately preferred.

Analysis in the Economic Case discounts the option of [redacted]. This is on the basis that the option presents a significant chance of incurring the high costs associated with a self-build option, while failing to guarantee connectivity and being exposed to similar risks and uncertainties associated with spur options.

A principal risk associated with [redacted] This onward connectivity would need to be contractually guaranteed for the lifetime of the new cable, as, if it is not secured, CIG’s new cable may in the future be subject to extortionate pricing. This onward connectivity could be secured either by an existing cable or a new cable. However, each presents challenges, and with neither is it possible to guarantee onward connectivity for the whole life of a new cable:

- **An existing cable**, by virtue of the fact that it already exists, is unlikely to be operational for the full duration of the life of a new cable. Onward connectivity late in the life of a new cable could therefore represent a significant challenge and cannot now be guaranteed. [redacted]
- **A new cable** could deliver onward connectivity, but (as with those cables relevant to spur options) CIG cannot be certain of their successful delivery. The options mostly comprise cables which have been identified as the basis for potential spur options and, while this risk may be tolerable for other spur options with significantly lower capital costs than the self-build [redacted], the combination of this risk with the significant capital costs of the [redacted] (progressed independently) results in the option appearing sub-optimal in comparison to both the self-build [redacted] conventional ‘spur’ options.

For these reasons, the Economic Case concludes that the self-build [redacted] option should not be prioritised. Similar issues would be associated with speculative cables to other locations in the region [redacted]. The remaining options are therefore a self-build to [redacted] or a spur option. The advantages and disadvantages of both approaches are significantly different but finely balanced, and CIG will need to determine its preferred approach on the basis of its weighting and perception of advantages and disadvantages of each, which are summarised in the following table.

The nature of an optimal deal with a cable developer for providing a spur could be quite bespoke to each situation to ensure the best infrastructure solution, factor in any advantages to the cable developer of providing the spur and potentially involve third parties whose proposals may have synergy with infrastructure to support the Cayman Islands. For some options there may be the possibility of buying into the wider cable enterprise as an equity partner. However, this may present a range of issues to the CIG in terms of governance and approvals for the investment and it is not clear that this would necessarily expedite or de-risk delivery of the wider project or otherwise support the objectives set for this project.

Table 2: Summary of approaches

Issue	Self-build to [redacted]	Connect via a Spur to a third-party cable	Conclusion
Technical specification	Capacity exceeds requirements. Lowest possible latency.	Capacity exceeds short- and medium-term requirements. Recent population growth, if extrapolated, could hasten the need for further capacity to be added[9]. Latency equivalent to or better than present performance.	Both options meet the Cayman Islands' needs for the foreseeable future. A spur option will need to be supplemented before the end of its life.
Capital cost	Estimated at [redacted] in 2022 prices, excluding a connection to the sister islands.	Estimated at [redacted], 2022 prices, excluding a connection to the sister islands.	The [redacted] is likely to require a significantly higher capital outlay than a spur option.
O&M cost	Estimated at [redacted] per year in 2022 prices.	Estimated at [redacted] per year in 2022 prices.	The [redacted] is likely to entail higher operational and maintenance costs than a spur option.
[redacted]	[redacted]	[redacted]	[redacted]
Control of capacity	Cable Co would have total control of capacity on the cable.	Cable Co would have total control of capacity on the cable, assuming that the important clause of exclusivity of connectivity to the Cayman Islands is successfully negotiated with the spur provider. This is the requirement that no other party (including the spur provider / developer of the trunk cable) would have any rights of use for the infrastructure landing in the Cayman Islands.	No meaningful difference identified between the two options, as both allow Cable Co full control of connectivity on the cable. A spur option that did not deliver exclusivity of connectivity to the Cayman Islands for Cable Co risks fundamentally undermining the commercial prospects of Cable Co and could risk issues around state-aid to other parties having use of the infrastructure.
Certainty of delivery	Relatively high, as Cable Co would directly procure the system on a 'turn-key basis from suppliers on the basis of a Request for Proposals.	Uncertain with regard to any specific commercial proposition as many spurs exist, many of which may never come to financial close. By seeking multiple offers in parallel, it is likely to be possible to secure at least one delivered connection. However, this cannot be guaranteed.	Significantly greater risk of non-delivery if CIG were to rely on a third-party cable provider, given the wider commercial challenges of delivering such cables.

[9] The Minister responsible for immigration has recently stated that the Cayman Islands' population grew by 10% in one year 2021-2022, although it is considered unlikely that this rate will be perpetuated.

Issue	Self-build to [redacted]	Connect via a Spur to a third-party cable	Conclusion
		While robust commercial negotiation should guarantee pricing for the lifetime of the cable, being tied to a single third-party provider for the lifetime of the new cable leaves limited options to secure a new provider should costs increase in the future for unforeseen reasons.	
Effect on pricing for users of capacity, such as ISPs	Depends on funding and financing approach, but other things being equal, higher than spur options. Unlikely to be less than pricing for the existing infrastructure. Unless subsidy is provided, might be difficult to improve on the potential pricing that a private sector cable could theoretically offer (but could still eliminate the uncertainty of pricing from a potential future private sector cable developer in a position of market dominance)	Depends on funding and financing approach, but other things being equal, lower than [redacted] options. Unlikely to be less than the incumbent provider but, even without subsidy, potentially more advantageous pricing than a future, private sector cable developer could offer.	It is likely that the current provider could undercut potential pricing from both options while the existing infrastructure is in operation, regardless of the funding and financing approach. If one of the existing infrastructure options is decommissioned, the spur option is more likely (and without subsidy) to improve upon the pricing that a private sector cable developer could offer. Both options, however, could eliminate the uncertainty of pricing from a potential, future private sector cable developer in a position of market dominance. Under either option, alternative approaches to marketing and pricing structure could be taken with the aim of maximising economic benefits.
Effect on pricing for business and consumers	The direct effect on pricing for consumers and businesses is likely to be low as subsea connectivity only represents a fraction of the overall consumer price. However stimulating competition may bring down prices for consumers.	The direct effect on pricing for consumers and businesses is likely to be low as subsea connectivity only represents a fraction of the overall consumer price. However stimulating competition may bring down prices for consumers.	Neither option is likely to lead directly to a reduction in price for consumers while existing infrastructure is in operation, but by stimulating competition the price of digital connectivity may be reduced.
Landing party issues	Cable Co would need to identify and contract with [redacted], who would provide a cable landing station and reliable onward connectivity to [redacted]. It is likely Cable Co would seek an 'operations and maintenance only' landing party agreement, to preserve its commercial control of the cable. In addition, Cable Co would need to act as a landing party in the Cayman Islands.	Cable Co would need only to act as a landing party in the Cayman Islands.	Both options require Cable Co to act as a landing party in the Cayman Islands. Self-build options require Cable Co to identify and contract with a third-party landing party overseas. This is therefore a more commercially complex option.

Issue	Self-build to [redacted]	Connect via a Spur to a third-party cable	Conclusion
[redacted]	[redacted]	[redacted]	[redacted]
Sale of capacity to other jurisdictions	Technically possible, with significant financial upside if achieved, even by third party developers using Cayman Islands as a hub. A minimum specification of cable on a self-build option would likely include significant excess capacity to support this. Uncertain that any demand [redacted] options available would involve significant, further investment, or would involve competing for demand in already competitive markets, which would import significant risk to the project if it were to rely on these.	Only possible if commercial terms with the cable provider permits the selling of capacity on to third-party jurisdictions. Whether trunk capacity could be made available to support this would also need to be confirmed.	The ability to sell capacity to third-party jurisdictions is likely to be technically possible with either infrastructure solution, so long as the appropriate commercial terms are secured by Cable Co from a spur provider. While demand is uncertain, if it is achieved, there is potentially significant financial up-side for Cable Co which could lead to a reduction in the price that it needs to charge for connectivity for domestic users and/or helps to finance a second new cable.

Funding, financing and pricing

A further element that CIG will need to consider in order to mandate Cable Co effectively is its preferred approach to the funding and financing of the infrastructure. The approach taken will directly affect the price that Cable Co finds it necessary to charge for use of the cable, as described below.

In this OBC, 'funding' refers to the ultimate source of funds for construction and management of the infrastructure. This is distinct from 'financing', which refers to the way in which funds are raised.

The Financial Case of this OBC shortlists two distinct possible approaches to the funding and financing of the infrastructure, as set out in the table below.

Table 3: Financing Options

Approach	Financing	Ultimate funding source
1	Government debt, CIG charges Cable Co at government cost of borrowing (assumed to be [redacted])	Users of internet capacity ultimately pay for the infrastructure through the pricing of capacity.
2	Government grant	Taxpayers on the Cayman Islands fund the infrastructure.

[redacted] has been assumed to be the government's cost of borrowing, as it is understood that [redacted]

[redacted]

The approach taken to funding and financing directly affects the revenue that Cable Co will need to generate from the market (and hence the price it will have to charge for the capacity that the market may use). This is because if Cable Co has to repay the investment in the infrastructure along with the rate of interest that the government has to pay on these funds (assumed to be [redacted] (approach 1), it will need to raise more funds from the sale of capacity than if no repayment has to be made (approach 2). In some modelling scenarios, sensitivity analysis has been undertaken to assess the effects of a different interest rate (or no interest) being charged in approach 1. In all scenarios, Cable Co is assumed to need to raise funds for the operation and maintenance of the cable (including its own staff costs) through the sale of capacity, as well as the repayment of any debt and interest necessary — the detailed assumptions are set out in the Financial Case.

The Financial Case undertakes modelling to assess what revenue Cable Co would need to generate from the market in order to cover its costs but make no profit, on the basis of many assumptions which are described in the Financial Case. Many of these assumptions have a degree of uncertainty, arising from the nature of the financial modelling undertaken which makes many uncertain assumptions. In some cases, these assumptions have had to be made because of challenges that the project team has faced in securing information about the market from present market participants and the regulator. These assumptions are described in the Financial Case of this OBC. In practice, the financial prospects of Cable Co will need to be monitored as the project proceeds to Full Business Case stage, and towards and into delivery.

The results of the modelling are summarised in the table below, and these figures are benchmarked for context in Figure 5. Revenue recovery is expressed in terms of the revenue (in current prices) per 10 Gbps of its assumed existing equivalent market share (i.e. share of the market at its current size – in future it is expected that increases market size would be offset by decreases in price). This allows ready comparison between indicative 'price points' but in practice alternative pricing models could be used as part of maximising the benefits of a new cable.

Table 4: financial results for required revenue per 10Gbps of assumed, existing equivalent market share.

$USD per 10Gbps per month	Government debt, [redacted]	Government grant
[redacted], with a link to Cayman Brac	[redacted]	[redacted]
Illustrative spur, with a separate cable from Grand Cayman to Cayman Brac	[redacted]	[redacted]

This domestic revenue requirement could be substantially reduced if Cable Co is successful in persuading a third-party jurisdiction to use the Cayman Islands as a 'hub', using capacity on the new cable for onwards connectivity to [redacted] This opportunity would be most relevant to the [redacted] self-build option where there would likely be spare fibre pairs built into even a minimum specification of cable. This prospect is highly uncertain, however. [redacted] Given that the ability to achieve this is uncertain, the Financial Case does not assume any sale of onwards capacity to third-party jurisdictions.

To avoid undue delay to progressing a solution for the Cayman Islands itself, CIG would likely have to commit to an option before confirming any use of it as an onward hub. Government bodies in relevant jurisdictions could be approached, however, and if opportunities are found and successfully realised, there could be very significant upside financial impacts. This kind of sale would only be possible on a 'spur' option if the commercial terms for the spur permitted the reselling of capacity to third-party jurisdictions and if the infrastructure and trunk capacity being secured is sufficient to support it. Cable Co should therefore seek to ensure that these issues are addressed in commercial negotiations.

There are conceptually multiple relevant 'price points' for comparison when considering a target level of revenue generation to support a new cable financially. Estimates of them, based on work towards this OBC, are set out in Figure 5 below. [redacted]

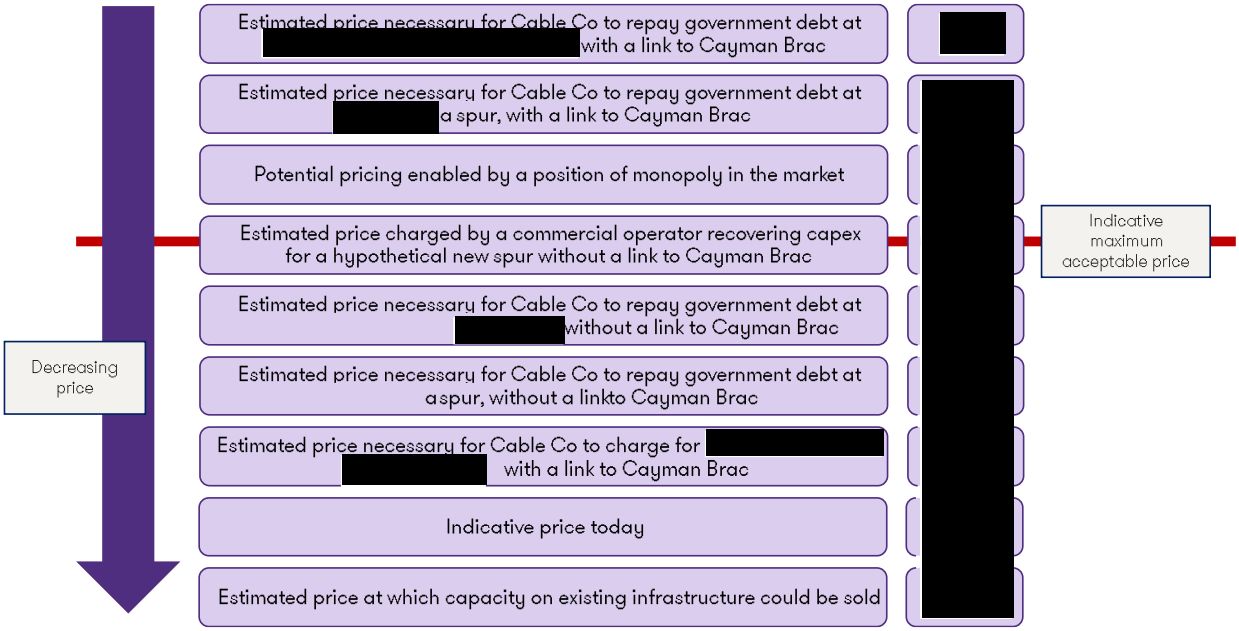

Figure 5: capacity 'price point' benchmarking estimates ($revenue per 10Gbps per month)

The diagram shows that all options that exclude a link to Cayman Brac and that are funded by government debt at [redacted] are estimated to offer a reduction in cost to the market for international connectivity compared to an estimated price point for a commercial operator delivering a new 'spur' link (which is also assumed not to include a link to Cayman Brac). Options that include a link to Cayman Brac and that are funded by government debt at [redacted] are required to generate slightly more revenue than a commercial new spur that does not include a link to Cayman Brac.

The Financial Case estimates that capacity [redacted] with a link to Cayman Brac would be able to be sold for the 'indicative maximum acceptable price' point if it were financed by a loan from CIG at an interest rate of [redacted]. Charging interest at a rate below the government cost of borrowing in this way may, however, increase the risk of challenge on grounds such as provision of state aid.

Recommendation 4: CIG to develop a Mandate for Cable Co on basis of information set out in this OBC, including a preferred approach for delivery and key financial constraints.

Considered in the round, CIG might decide to pursue a [redacted] option if CIG:

- prefers to guarantee delivery itself and not be dependent on third-party providers
- has access to the funds necessary for the more expensive option
- is willing to finance the cable with an interest rate on funds that is below the government cost of borrowing, and is willing to justify this on the grounds of economic benefits if challenged
- is willing to tolerate a potentially longer (but more certain and controllable) time to deliver the new infrastructure compared to a spur option, noting that MAYA-1 may be decommissioned in the coming years

Conversely, CIG might decide to pursue a spur option if CIG:

- prefers a more affordable option from both a capex and opex perspective, potentially leaving funds available for a second cable to provide additional resilience
- wishes to get a new cable into service as rapidly as possible (because third parties with well-developed schemes are likely to be able to deliver more quickly than starting a new self-build project from scratch) but accepts that this timescale is exposed to significant commercial risks.
- wishes the cost of the infrastructure to be recovered from the project with an interest rate equal to the government's cost of borrowing

- prefers not to require Cable Co to contract with a third-party landing party overseas.

Subject to the commercial terms secured, both options may allow the Cayman Islands to sell capacity on to other jurisdictions. The ability to find customers for this sale of capacity is highly uncertain, but, if achieved, it could deliver significant financial benefits to the project.

Connecting to Cayman Brac

An important matter that CIG will need to consider in its Mandate for Cable Co is connectivity to Cayman Brac (connectivity to Cayman Brac is shared with Little Cayman by radio link, so no additional cable for Little Cayman is needed).

Securing the economic and social benefits that a new cable will bring for *all* the population of the Cayman Islands would require that additional connectivity is secured for Cayman Brac, as 2,257 people live there[10] who will not otherwise benefit from a new cable that lands only in Grand Cayman. However, providing a new cable between Grand Cayman and Cayman Brac is likely to add around [redacted] to the overall capital cost of the project. Depending on the precise infrastructure options chosen (the cable could be part of a new international cable, or a stand-alone link between the islands), this is an increase to the capital cost of the project of between around [redacted], which would serve only 3% of the population. Estimates in the economic case show that the capital cost of new connectivity per capita on Grand Cayman may be around [redacted] option. Extending this capacity to Cayman Brac and Little Cayman might cost around [redacted] per resident of Cayman Brac and Little Cayman.

Because of this significant difference in cost per capita of delivering connectivity, CIG should consider alternative approaches to securing resilient connectivity for the sister islands. In order to support this, Cable Co could consider the ability of satellite systems to provide resilient capacity for the sister islands, to allow CIG to assess whether that could provide a better way to ensure connectivity than extending a new subsea cable.

Recommendation 5: as an early priority, the Mandate should require Cable Co to report on the viability of satellite solutions to provide resilient capacity for the sister islands

An crucial element of optimisation of the financial prospects of Cable Co will be to ensure that a robust commercial strategy is in place to sell capacity once the cable (or cables) have been delivered. CIG should therefore mandate Cable Co early in its existence to develop early proposals for the optimal way to structure and manage the sale of capacity to users (including any potential third-party jurisdictions). This approach should be developed and set out in detail in the project's Full Business Case.

Recommendation 6: in addition to securing construction of a new cable, the Mandate should require Cable Co to develop early proposals for the optimal way to structure the sale of capacity to on-island users

D. Move to delivery

Once Cable Co has been established (*Recommendation 2*), an appropriate governance structure including a Framework and Funding Agreement has been put in place (*Recommendation 3)* and a Project Mandate delivered (*Recommendation 4)*, Cable Co can begin commercial operations within the boundaries specified by its governing documents.

The nature of this commercial operation will depend on the content of CIG's Project Mandate. If a self-build option is preferred, then a technical specification will need to be developed and a procurement run. If a 'spur' option is preferred, then bilateral negotiations with potential providers will need to be commenced so that a preferred provider can ultimately be selected, and a direct award made. Timelines for these approaches are set out in the Management Case.

[10] Cayman Islands 2021 Census Report Highlights, Economics and Statistics Office, page 4, Table 1.1D

Once Cable Co has reached a final preferred solution, it should submit a Full Business Case to its Sponsor in CIG, seeking approval to sign the contract. The Full (or sometimes, 'Final') Business Case is the third and final stage of the business case process, and represents a further development of this Outline Business Case. The Full Business Case should set out in detail the project's final tendered costs and commercial terms, and Cable Co's approach to project management, permitting and licencing, risk management, and its preferred approach to the ongoing commercialisation of the cable once it has been delivered. The SRO as Sponsor, supported in his/her decision by the Sponsor Board and deferring to Cabinet as appropriate, should consider this in a timely manner and, again if appropriate, grant approval for Cable Co to sign the contract and proceed to delivery.

As part of assembly of the Full Business Case, Cable Co must conduct a detailed examination of how to best facilitate access to the cable for prospective purchasers of capacity. This could, for example, include a data centre, or a location that is convenient for existing telecommunications networks where making a connection to the new cable would not incur uneconomic costs to any market participant.

Recommendation 7: Cable Co to develop FBC covering the detail of the proposed contract with the preferred provider, its approach to project management, permitting and licencing, and ongoing commercialisation. This supports an investment decision in the developed solution from CIG.

Particularly in the event that CIG's Project Mandate calls initially for only one international cable, as one of Cable Co's broader responsibilities it could be required by CIG to monitor the Cayman Islands' international connectivity market, and assess on an ongoing basis the level of risk to the islands' resilience (including, for example, monitoring the market for any indications that the incumbent operator of the repeaterless CJFS system is considering decommissioning the system). This monitoring would be regularly reported to CIG, potentially through the Project Sponsor Board.

This reporting could support the development of a further Outline Business Case for a second international cable, should it be considered that current resilience capacity is at risk.

[redacted]

Once the new cable has been constructed and accepted into use, it will be the role of Cable Co to manage its ongoing operation and maintenance, balancing the social and financial requirements of the CIG's project mandate, and reporting to CIG on the cable's performance, financial position and risk on an ongoing basis. This could include actively seeking third party jurisdictions who may wish to land on the Cayman Islands to make use of the new cable for onward connectivity, which could bring significant financial benefit to Cable Co. This role of Cable Co is anticipated to endure for the full life of the cable, which is assumed in this OBC to be 25 years.

Recommendation 9: Cable Co to take responsibility for the ongoing management, operation, maintenance, repair and commercialisation of the new cable for its full life, including through seeking opportunities for sale of onward connectivity to third-party jurisdictions.

E. Summary of recommendations

This Outline Business Case sets out the following nine recommendations and suggested timescales for the Cayman Islands Government.

Table 5: Summary of recommendations and suggested timescales

Recommendation		Suggested Timescale
1	That CIG proceeds with the project to secure new international subsea cable connectivity, making its intentions publicly clear.	Ongoing
2	That CIG establishes and staffs a government-owned 'Cable Co' to act as Client for the project.	Immediately following Cabinet decision to proceed. Staff appointed by Winter 2022.
3	That MPAHI acts as sponsor for Cable Co, supported by a cross-CIG project Sponsor Board, and establishes appropriate governance of Cable Co as described in the Management Case.	Immediately following Cabinet decision to proceed. Staff appointed by Winter 2022.
4	That CIG develops a Mandate for Cable Co on basis of information set out in this Outline Business Case, setting out its preferred approach for delivery of connectivity.	Immediately following Cabinet decision to proceed
5	That, as an early priority, the Mandate should require Cable Co to report on the viability of satellite solutions to provide resilient capacity for the sister islands.	Once Cable Co established — report by Winter 2022
6	That, in addition to securing construction of a new cable, the Mandate requires Cable Co to develop early proposals for the optimal way to structure the sale of capacity to on-island users.	Early proposals to Sponsor in Spring 2023. Final proposal set out in Full Business Case, Summer 2023.
7	That Cable Co develops a Request for Proposal and develops a Full Business Case, covering the detail of the proposed contract with the preferred provider, its approach to project management, permitting and licencing, and ongoing commercialisation. This supports an investment decision in the developed solution from CIG which could occur six months after release of a Request for Proposal.	By Summer 2023
8	That, if CIG decides to initially pursue only one new cable, CIG keeps the case for a second cable under review, and, if necessary, develops a new Outline Business Case for a second cable system to be developed in light of the emerging Full Business Case for the first cable and any emerging market intelligence on existing infrastructure.	Ongoing basis, following any decision to pursue only one cable.
9	That Cable Co takes responsibility for the ongoing management, operation and maintenance of the new cable for its full life, including through seeking opportunities for sale of onward connectivity to third-party jurisdictions, reporting regularly to its Sponsor in CIG.	Following delivery of new infrastructure.

F. Development of Mandate in Respect of a Second Cable

Recommendation 5 of this OBC is that CIG develops a Mandate for Cable Co, to set out its preferred approach for delivery of connectivity. This Section describes the fundamental decisions that Cabinet will need to make to determine the content of the Mandate, relating to the nature and timing of a second cable.

- Does CIG wish to self-build a link to [redacted]
    - One of the principal advantages of directly commissioning a link to [redacted] is that it provides a relatively high degree of delivery certainty, although the timescales may be longer than the (albeit less certain) spur options.
    - Given the uncertainty about the remaining lifespan of the present infrastructure, it appears therefore that there would be little merit, after deciding to build a link to [redacted] which provides relatively certain connectivity, to then delay its implementation even if the expectation is that CIG would also pursue a second cable connection. If CIG wishes to pursue a link to [redacted] there are advantages to proceeding immediately.
    - If CIG does not on balance consider that the benefits of a self-build option justify the costs, then CIG's first steps should be to secure an optimal spur option by pursuing negotiations with the range of potential providers.
- How should Cable Co plan towards a second cable?
    - Delivering two cables would avoid a scenario in which the Cayman Islands is dependent on the incumbent operator for providing resilience (i.e. 'backup' capacity) through the existing infrastructure. Doing so sooner rather than later would avoid the risk of a gap in this resilience but risk some financial inefficiency if market capture is low in early years. It might also be unnecessary if a private sector developer were still to replace one of the existing cables after an initial CIG intervention.
    - Given the significantly higher costs of a 'self-build' option compared to connecting to a third-party spur, the limited marginal benefits of securing a second self-build option, and the wide range of potential third-party options currently available, it would appear that a spur option would represent the most efficient approach for a second cable, regardless of whether a self-build cable to [redacted] is being pursued as the immediate priority.
    - However, the timing of delivery of a spur option is outside the direct control of CIG as it is dependent on the third-party provider. Therefore in any event, it would make sense for Cable Co to begin engaging with the market to pursue the possibility of either a second spur connection or a spur to complement a [redacted] self-build.
    - Once a procurable spur (or second spur if no self-build [redacted] option), this should be presented for CIG approval in the form of a Full Business Case before proceeding to allow a review of the emerging market at that stage and confirm any decision to proceed with that second cable.
    - If, through negotiations with potential providers of spur options, it becomes certain that a spur option to complement a [redacted] self-build cable can confidently be delivered sooner than the self-build, then the timing of delivery of the [redacted] link (if pursued) could be reviewed.

Strategic Case

Strategic Case: table of contents

A. Introduction

77. This Strategic Case is structured as follows:

- Following this introduction, **Section B** introduces the project, describes its progress to date and sets out the rationale for the CIG to undertake it.
- **Section C** describes the policy context for the project, and explains how it fits into the broader agenda of the Cayman Islands Government.
- **Section D** describes the project's objectives, and how they have evolved since the Strategic Outline Case was assembled.
- **Section E** reviews the Cayman Islands' telecommunications market, and describes the ways it has changed over recent years.
- **Section F** considers the Cayman Islands' demand for digital connectivity, and forecasts its future needs.
- **Section G** considers the Critical Success Factors for the successful delivery of the project.
- **Section H** considers the Cayman Islands' requirements, in light of Sections E, F and G.
- **Section I** describes and explains the high-level potential infrastructure solutions that have been considered at OBC stage, and the categories into which they fall.
- **Section J** describes conceptual commercial approaches to the delivery of the project.
- **Sections K and L** consider the dependencies, constraints and strategic risks facing the project.
- **Section M** completes the Strategic Case by summarising its conclusions, and explaining how these affect the other four cases of the OBC.

B. Background to, rationale for, and purpose of the project

78. This section describes the background to the CIG's Digital Connectivity project and summarises the progress that has been made to reach this OBC stage.

Rationale for the project — problems arising from existing arrangements

79. High capacity, reliable and affordable telecommunications services are recognised by the CIG to be the life blood of any modern economy, and to be critical to adapting to the global digital transition. They are fundamental components of economic and social activity across the Cayman Islands, supporting citizens in their education, healthcare, entertainment, work and social activities. Since the Covid-19 pandemic, many organisations in the Cayman Islands have transitioned to digital work, conducting meetings through videoconferencing and collaborating online.

80. The Cayman Islands' island topography and cosmopolitan outlook underlines the need specifically for high-capacity, reliable and affordable *international* digital connectivity, to allow the country to engage effectively with the rest of the world. This kind of international capacity can currently only currently be delivered at the required standard by subsea cables. For this reason, the CIG considers subsea cables Critical National Infrastructure — in other words, they are infrastructure that is necessary for the country to function and upon which daily life depends, and the loss or compromise of them could result in major detrimental impact on essential services, or significant impacts on national security or the functioning of the state.

81. There are currently two digital subsea cables that connect the Cayman Islands to international destinations: MAYA-1 and CJFS.

    - **MAYA-1** is the principal cable system providing subsea connectivity to the Cayman Islands. It began service in 2000, and spans 4400km from [redacted] to Columbia with a landing station in Half Moon Bay on Grand Cayman, as well as landing stations in Mexico, Honduras, Costa Rica, Panama and Colombia. It is owned and operated by a consortium. The system is discussed further in Section E below.
    - The **Cayman-Jamaica Fibre System** (CJFS), a repeaterless subsea cable connecting Grand Cayman and Cayman Brac to Jamaica, which began service in 1997. It is 870km long, and owned by C&W Networks.

82. The ICT regulator, OfReg, has indicated that there has been no major investment in new international digital connectivity for the Cayman Islands in the last twenty years. The Cayman Islands Government considers that this introduces risk to the islands and represents a threat to the islands' future.

83. Work at OBC level has developed the project team's understanding of the problems facing the Cayman Islands, that have given rise to the need for this project. Five factual features of the current situation have been identified; each of these features can be considered to represent a problem for the Cayman Islands.

84. The five factual features identified are:

    - **The lack of ICT investment and competition in the Cayman Islands**

      CIG perceives there to be a lack of ICT investment and competition in the Cayman Islands.

    - **The existence of a dominant supplier for international connectivity**

      As explained in Section F of this Strategic Case, a single entity, Liberty Latin America (LLA), controls both of the international cables connecting the Cayman Islands with the rest of the world.

      All other telecommunications service providers rely on LLA for wholesale capacity and services.

- **The lack of diversity of data routes**

  The existence of only two cables — MAYA-1 and CJFS — means that there is relatively low diversity of data routes from Cayman to the rest of the world.

- **Possible impending life expiry of existing infrastructure**

  CIG has no clear visibility of plans for the future of the existing MAYA-1 cable, and the project team has sought to investigate this during work to develop this OBC.

  It is understood that, typically, consortium members are typically able to exercise a right to opt-out of a consortium cable by giving notice at the end of approximately 23 years of the cable's life, which for MAYA-1 would be at the end of 2023. If some parties were to walk away, the costs of operating the infrastructure are likely to fall on the remaining consortium members. If all parties were to walk away, the system would stop operating. It is therefore possible that the system may stop operating at any point 2023, although it is unclear that any consortium members have yet made firm plans as to what to do following the end of their contractual commitment.

  [redacted]

  One scenario under which consortium members may exercise their rights to withdraw from MAYA-1 would be if other new cables built to accommodate non-Cayman traffic were to exhibit significantly lower bandwidth costs than MAYA-1. [redacted]

  Further analysis of the lifespan of existing infrastructure is provided in the Management Case of this OBC.

- **Limitations on capacity of existing infrastructure**

  MAYA-1 has been upgraded several times since its creation, most recently in 2017, which has increased its capacity. However the scope for further increases in the cable's capacity are understood to be limited.

  Cable & Wireless's available capacity on MAYA-1 is currently understood by CIG to be [redacted] (although it has not been possible to verify this figure from third-party sources). Media reports suggest that utilisation was at 41% in 2021. Assuming a 24% cumulative annual growth rate (as discussed in Section F of this OBC), its capacity would be full by 2027 (assuming no further upgrades).

  Capacity on the CJFS system to Jamaica is understood to be considerably higher. As set out in the Management Case, the system is understood to have four fibre pairs, each of which, if upgraded, could deliver eventual capacity in the region of [redacted]

[1] Stakeholder engagement meeting, 30 May 2022

85. Various combinations of the features described above give rise to problems for Cayman Islands' connectivity. The six problems identified are:

- **A lack of choice and innovation for consumers**

  CIG considers that consumers in the Cayman Islands do not benefit from the level of choice and innovation with regard to digital connectivity and associated products that can be found in other jurisdictions.

- **Expense for consumers**

  Consumers of digital services in the Cayman Islands face high costs. A 2021 survey conducted by BVA BDRC and provided by cable.co.uk found that the "average cost of a monthly internet package" in the Cayman Islands was the 10th most expensive in the world.

- [redacted]

- **A risk of decreasing cable reliability**

  Cable reliability relates to the frequency of failures and the time required to repair these failures. In terms of reliability of the main infrastructure (subsea cable and land-based transmittal equipment), there is often a 'bathtub' profile of cable reliability over its life, where the cable is frequently damaged in the early stages after deployment, but then improves – for example, as fishing fleets become more aware of the new cable's location. As a cable ages, the chance of component failures may increase, and the availability of spare parts may become increasingly limited. Both factors may lead to a decrease in reliability as the cable ages. This factor becomes increasingly relevant in Cayman Islands, as both Maya-1 and CJFS cables are aging as described in the Management Case of this OBC. Some stakeholders have commented on relatively low reliability levels for existing infrastructure but in practice this may be partly due to the frequency of (and/or average time to fix) failures to do with connection to the main infrastructure and wider systems integration.

- **A risk that connectivity may be lost in the future**

  It is not clear to the CIG for how long the existing infrastructure will remain operational. This is a particular issue given the MAYA-1 cable is understood to be reaching the end of its design life. CIG knows of no verified plans for third parties to land further subsea cables on the Cayman Islands.

  In June 2022, telecommunications company Seaborn Communications made an application to the Cayman Islands' regulator OfReg for a licence to connect a new undersea communications fibre-optic cable. The financial viability and status of this proposal is currently unclear, and so without further investigation reliance cannot at this stage be placed on this system to ensure future connectivity for the Cayman Islands.

- **Limitations on data transfer.**

  It is not clear to CIG that present infrastructure is sufficient to meet the Cayman Islands' capacity needs over the medium or longer term.

86. The relationships between the features of the current situation and the problems that they give rise to with regard to the Cayman Islands' international connectivity are relatively complex, but can be illustrated by Figure 1 below.

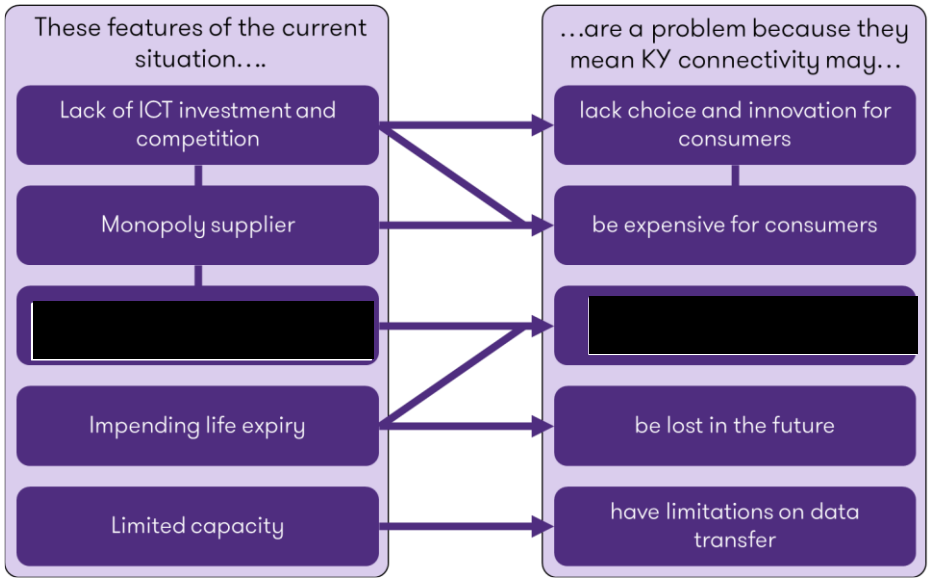

Figure 1: problems arising from the present situation

87. The diagram shows that various factors of the present situation (several of which are linked to the existence of a dominant supplier of subsea connectivity) together can be seen to drive the problems identified for the Cayman Islands. The links between features of the current situation and the problems are not altogether straightforward, and some features introduce aspects of more than one problem.

88. The purpose of the project is to allow the Cayman Islands Government to consider the options available to address the problems described above, and to support decision-makers to choose an appropriate way forward for the Cayman Islands.

Background: The Strategic Outline Case

89. This OBC follows an earlier Strategic Outline Case (SOC), which was produced in 2021 by the CIG[2]. In line with the UK government's Better Business Cases guidance[3], the SOC represents an earlier stage in the process of the development of a business case than the OBC, and this OBC therefore develops, refines and expands the original SOC, building on feedback, stakeholder views and the developing wider environment on the SOC. It thus represents an evolution of the SOC, rather than being a competing or alternative document. This document is the Strategic Case of the Outline Business Case, as shown in Figure 2 below.

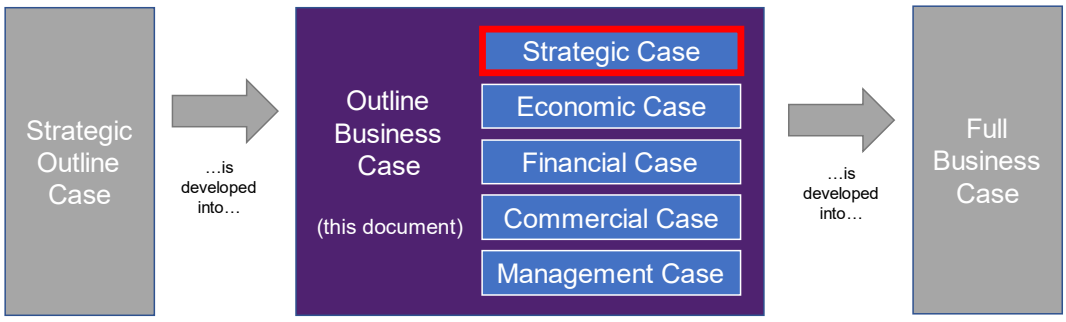

Figure 2: the Outline Business Case in the context of the Strategic Outline Case and the Full Business Case

90. As the diagram at Figure 2 shows, the third and final stage of the business case process is the Full Business Case, which will set out costs for approval following procurement. Work to develop

[2] Cayman Islands Submarine Cable Modernisation Plan, Ministry of Commerce, Planning & Infrastructure, 2021 ('the SOC')
[3] Guide to Developing the Project Business Case, HM Treasury and Welsh Government, 2018

this stage of the business case is dependent on approval of this OBC. The Management Case of this OBC considers how and when this next stage should be pursued.

91. The project team for this OBC reviewed the SOC as part of the work to develop this OBC and have undertaken a separate analysis of it to inform the structure and content of this OBC[4].

92. The SOC made a number of recommendations to Cabinet[5]. These were:

    1. Approve the project — to cause the implementation of a 3rd submarine cable and network infrastructure for the Cayman Islands;
    2. Approve the Ministry of Commerce, Planning and Infrastructure to hire a project manager with submarine cable expertise for the duration of the Project;
    3. Approve the hiring of a consultancy firm with relevant expertise to develop the Business Case; and
    4. Approve the establishment of a special purpose vehicle to deliver, own, operate and manage the project.

    Following its completion, Cabinet reviewed the SOC and took into consideration its recommendations. Cabinet approved the Ministry of Commerce, Planning and Infrastructure to proceed to the development of the Outline and then Full Business Cases.

93. Since the SOC was assembled, further work has been conducted as part of moving the project forward to OBC stage. With regard to this strategic case, the principal developments in this iteration of the business case are:

    - Refinement of the project's objectives, to crystalise the requirements of the project.
    - An in-depth study of the Cayman Islands' telecoms market has been conducted and is set out in Section E of this strategic case.
    - A demand forecast for the Cayman Islands has been undertaken as set out in Section F.
    - The system requirements for new subsea connectivity for the Cayman Islands have been assessed and are recorded at Section G.
    - A detailed 'whiteboard' assessment of the conceptual possible infrastructure approaches was conducted, building out the high level categories of option that were identified in the SOC. The results of this exercise are shown in Section H of this strategic case. In total nineteen options have been identified and considered. A number of these have been discounted in the strategic case; the remaining options are taken forward to the Economic Case of this OBC for more detailed qualitative and quantitative assessment.
    - An extensive programme of stakeholder engagement was conducted by the project team. In total twenty-seven stakeholder meetings were conducted, and the wide range of views expressed have informed development of this entire OBC. The project team is grateful to the many stakeholders who freely gave their time to contribute to the project.

[4] CIG Cable SOC review feedback 18May2022.pdf
[5] SOC, page 6

C. Policy context and strategic fit

94. This section describes the context for the project, and explains how this project demonstrates strategic alignment with the CIG's broader strategic priorities.

Context

95. In April 2021, a general election was held in the Cayman Islands, following which a new government was formed.

96. The **Strategic Policy Statemen**t (SPS) of July 2021[6] represents the principal statement of strategic direction of the newly-elected Cayman Islands Government, and thus sets out most clearly the strategic context for this project.

97. The SPS sets out the government's overall approach articulated through ten strategic outcomes, with commitments to specific actions underlying each. The ten broad outcomes are[7]:

    1. Improving **education** to promote lifelong learning and greater economic mobility.
    2. Ensuring an equitable, sustainable and successful **healthcare** system.
    3. Providing solutions to improve the **well-being** of our people so they can achieve their full potential.
    4. Strengthening good **governance** for more effective government.
    5. Supporting **climate change** resilience and sustainable development.
    6. Increasing **social justice** in the workforce.
    7. Utilising **sports** to enhance the lives of our people.
    8. Building a **modern infrastructure** to ensure a successful future for our Islands.
    9. Improve our **financial services** as an industry, product and economic driver for our islands.
    10. Improve our **tourism**, as an industry, product and economic driver.

98. Many of these broad outcomes and the underlying actions represent relevant context for decision-makers in considering whether and how to proceed with the digital connectivity project. The applicability of each of these broad outcomes to this project is assessed in Table 1 below.

[6] Strategic Policy Statement 2022-2024, Cayman Islands Government, July 2021
[7] SPS, page 47

Table 1: relevance of digital connectivity to CIG's Strategic Policy Statement

	Strategic Policy Statement: broad outcomes[8]	Relevant underlying specific actions set out in the Strategic Policy Statement	Commentary on relevance of this project to delivery of objective
1	**Improving education to promote lifelong learning and greater economic mobility**	**3. Invest in tomorrow's economy through STEAM, training, and technology** b. Promote more private sector internship/apprenticeship opportunities d. Improve technology infrastructure in schools to support increased usage.	Attracting new digital and technology focused businesses to the Cayman Islands may support more internship and apprenticeship opportunities for Caymanian students. Improving digital connectivity may support improvement technology infrastructure and increased usage in schools.
2	**Ensuring an equitable, sustainable, and successful healthcare system**		Improving digital connectivity may support the ability of healthcare providers to perform or offer telemedicine and robotic-assisted procedures in the Cayman Islands. High performance connectivity can help to lower the cost of health care through technology and improved data capture and use.
3	**Providing solutions to improve the well-being of our people so they can achieve their full potential**	**3. Create a modern social infrastructure** a. Create new industries and expand existing – e.g film, agriculture	Provision of improved internet connectivity may support the creation of new industries and the expansion of existing industries within the Cayman Islands.
4	**Strengthening good governance for more effective government**	**4. Increase public … access to information** b. Transparency in all Government activities d. provide a platform to encourage greater public participation in decision-making	Improved digital connectivity and broader consumer access to internet connectivity may support the ability of the CIG to democratically engage with the people of the Cayman Islands through digital means.
5	**Supporting climate change resilience and sustainable development**		Improved digital connectivity may improve the Cayman Islands' ability to manage climate change

[8] https://www.caymancompass.com/wp-content/uploads/2021/07/2022-2024-Strategic-Policy-Statement.pdf

	Strategic Policy Statement: broad outcomes[8]	Relevant underlying specific actions set out in the Strategic Policy Statement	Commentary on relevance of this project to delivery of objective
			by reducing the need for on-island transport, and optimising supply chains.
6	**Increasing social justice in the workforce**	**3. Increase the minimum wage** **4. Increase work experience opportunities through public/private sector partnerships**	Attracting new digital and technology focused businesses to the Cayman Islands may support more work experience opportunities, and may grow the economy to allow the minimum/liveable wage to be increased.
7	**Utilising sports to enhance the lives ofour people**	**4. Support growth through funding** **5. Enhance facilities for optimum results**	Attracting new digital and technology focused businesses to the Cayman Islands may grow the economy to allow greater funding for sports, which could also enhance sporting facilities available on the Cayman Islands.
8	**Building a modern infrastructure to ensure a successful future for our Islands**	**2. Build a modern infrastructure** a. Provide funding for the implementation of a new underwater communications cable to ensure Cayman remains connected to the world	Provision of new subsea connectivity directly correlates with these objectives set out within the government's plans to build a modern infrastructure.
9	**Improve our financial services as an industry, product, and economic driver for our islands.**	**2. Maintain our best-in-class reputation** c. international promotion of the Cayman Islands' strong legal, regulatory and compliance infrastructure	Provision of improved digital connectivity will support the Cayman Islands' position as best-in-class for financial services.
10	**Improve our tourism, as an industry, product and economic driver**	**2. Expand and diversify our domestic tourism product**	Improved digital connectivity on the Cayman Islands could support local tourism businesses by supporting digital engagement and booking for tourists, and could improve the attractiveness of the Cayman Islands to tourists by reducing the costs of connectivity on the islands.

99. The table demonstrates that in addition to explicitly delivering the commitment under Broad Outcome 8 to implement a new underwater communications cable, delivery of improved international digital connectivity for the Cayman Islands would, to varying degrees, support all ten of the government's Broad Outcomes sought. The project therefore demonstrates strong strategic alignment with the CIG's strategic priorities.

D. Project objectives

100. Clearly-defined objectives for the project are an important factor in making a case for intervention, as ideally they should clearly describe what the Cayman Islands Government is seeking to achieve in undertaking the project. They can thus also provide the basis for post-project evaluation.

Objectives at Strategic Outline Case

101. The Better Business Cases guidance sets out that 'the setting of … objectives is an iterative process'[9], and as a result the objectives for the project that were set at SOC level have been refined and developed as part of work on the OBC.

102. At SOC level, the following project objectives were determined[10]:

- To support economic growth throughout the entire Cayman Islands with the addition of a 3rd submarine cable.
- Attract or cause investments in the local ICT network to ensure the Cayman Islands has the best high-performance network that is reliable, integrated and facilitates choice.
- Provide a connected, accessible public broadband network that strengthens opportunities for social and economic participation to ensure digital inclusion.
- Deliver the Cayman Islands an affordable project solution that drives innovation.

Developing the case for change

103. In developing the OBC, a workshop was held by the project team on 18 March 2022 to consider and refine the project objectives. The workshop considered the problems arising from the current position, CIG's objectives; and the potential benefits of intervention.

104. A number of benefits of intervention were identified, grouped under three headings:

- **Benefits to Government —** better digital connectivity could:
  - support the delivery of government services online
  - support resilience in crises
  - support the Cayman Islands to be the economic centre of the Caribbean, and the largest centre for financial services
  - ensure that the Cayman Islands are at the forefront of technological investments
  - support inward investment and a more diversified economy.
  - support sustainable demographic through investing in the citizens of Cayman
  - support government revenues
  - support delivery of other policy objectives, as set out in Table 1
- **Benefits to Businesses —** better digital connectivity could:
  - support better quality and price for ICT services in the Cayman Islands, if more competition is generated
  - support future productivity gains enabled by growing data capacity
  - support business resilience
  - lower barriers to entry & access to global markets for local SMEs
- **Benefits to Consumers —** better digital connectivity could:
  - support better quality and price for ICT services if more competition is generated

[9] Guide to developing the Project Business Case, HM Treasury and Welsh Government, 2018
[10] SOC, page 11

- support digital inclusion and access to education/healthcare.
- support social and economic participation.

Revised objectives at OBC

105. Taking the discussion in the workshop into account, the SOC's set of objectives was refined. The revised set of objectives for OBC has been amended from those at SOC so that they are distinguishable from the means of provision (so that the focus is on what needs to be achieved, rather than the potential solution), and have been reduced number to seek to sharpen the clarity and focus of the project.

106. The revised set of objectives for the project at OBC level were agreed to be those shown in Figure 3 below.

Figure 3: OBC project objectives

E. Telecommunications market review and evolution

107. This section describes the current telecommunications market in the Cayman Islands,

Cayman Islands Marketplace and Evolution

108. As an affluent, advanced economy, the Cayman Islands are well served by telecommunications (including telephone and Internet and excluding broadcast radio and television).

109. Telecommunications services historically[11] were provided by the carrier Cable & Wireless (Cayman Islands) Ltd., then a division of the British Cable & Wireless plc. This company was demerged from Cable & Wireless plc in March of 2010 as part of Cable & Wireless Communications. This company was subsequently purchased by the British-Dutch-American multinational Liberty Global plc in 2015. Operations in the Caribbean and Latin America were spun off as Liberty Latin America Group with C&W Networks operating the wholesale network including their undersea cables and the FLOW brand offering retail services in the Cayman Islands.

110. Notably, Liberty Latin America (LLA) controls all of the international cables connecting the Cayman Islands with the rest of the world. All other telecommunications service providers rely on LLA for wholesale capacity and services.

111. International connectivity via satellite is also available. Although the 60-year-old scheme to place telecom satellites in geosynchronous orbit provides an unsatisfactory solution for providing the services required by today's customers (the latency is too high, launch costs are comparatively high, and the available bandwidth is low). Newer solutions are available.

112. The Iridium low-earth-orbit (LEO) satellite constellation went bankrupt in 1999 in one of the largest bankruptcies in American history until that time. Out of bankruptcy, the company continued and now is one of a handful of companies with many new technologies vying to offer data services via satellite.

113. Although there are well funded efforts from Europe (OneWeb), Canada (Telesat Lightspeed), and many from China (State Grid, Rainbow Cloud, Wild Goose, and Galaxy Space), Amazon's Project Kuiper and Starlink's SpaceX have received most of the attention. However, most of these systems are intended for customers that cannot be tethered to more traditional telecom providers, e.g., military, marine operations, remote areas, airplanes. The limitations of these services are caused by the need to use scarce radio bandwidth and the limited ability to reuse radio frequencies. This is not a problem since the business plans for many of these new services range from places like Africa (with approximately 200M premises that do not have reliable cell coverage) and rural America.

114. Even Starlink, with the largest constellation planned with an expected 30,000+ satellites (hence the greatest opportunity for frequency reuse), was rejected for even rural service provision by the United States' FCC (see August 10, 2022's public notice from the FCC[12]) due to the expected steady decline in speed as the number of users increases and the service's relatively high price. Media reports are that each satellite has a throughput of about 20 Gbits per second. While this may be adequate for serving 1,000 users on Grand Cayman using mobile 4G devices, it does not compare with the tens of terabits per second that are available via fibre connection (this from a single fibre). Low cost, terabit-per-second speed services are expected to provide the data centre services envisioned in this report. Also, to our knowledge Starlink does not offer (nor was it designed to provide) a guaranteed gigabit-per-second service that is intended for serving datacenters.

[11] Following the first successful transatlantic telephone cable (1956), Cable & Wireless set out to connect the major parts of the Commonwealth. The first telephony cable was installed between the two Commonwealth nations of Jamaica and the Cayman Islands (Georgetown) with 120 voice circuits in 1971. Cable and Wireless also brought inter-island telephony to the Cayman Islands in 1966 using radio. Cayman Brac was connected by C&W by telephone cable in 1984.

[12] https://www.fcc.gov/document/11th-rdof-ready-authorize-public-noticebid-defaults

115. The suitability of satellite services for the Cayman Islands is discussed further in Section H of this Strategic Case.

116. Other service providers that operate in the Cayman Island are Digicel, C3, and Logic.

- Globally, **Digicel** operates many telecommunications service providers including many in the Caribbean. Digicel also has a collection of 4 undersea cable operations although none of their cables service either the Cayman Islands nor neighbouring Jamaica.
- **C3** operates as an Internet Services Provider (ISP), television and telephone provider on Grand Cayman. It prides itself as the only service provider that is owned locally (though this could not be confirmed independently). In an April 2022 press release, the company announced that "after 5 years of negotiation" the company obtained access to the cable landing stations of both MAYA-1 and CJFS. The details of this relationship are unknown, but theoretically this could allow C3 increased speed international services.
- Backed by One Communications in Bermuda, WestTel was formed in 2004 and began its fibre-optic buildout. The company changed its name to **Logic** in 2010. As of 2015, Atlantic Tele-Network – ATNI –- (which purchased One Communications) owns Logic Cayman (along with GTT in Guyana, One Communications in Bermuda and in a recent acquisition Alaska Communications).

Structure of the telecommunications market

117. In any discussion of a telecommunications market, great care must be taken to define the terms being used.

118. For any place in the world, there is no such thing as one telecommunications market; there are dozens or hundreds of markets that:

- Offer many different telecommunication services (e.g., television, Internet, radio)
- Offer different services customised for different types of customers (e.g., business services and residential services)
- Service providers who support other service providers (e.g., fibre providers, support long haul providers, supporting end-user services, outside plant, invoicing, etc.)
- Sometimes compete with each other (e.g., "cable" television and video-on-demand)

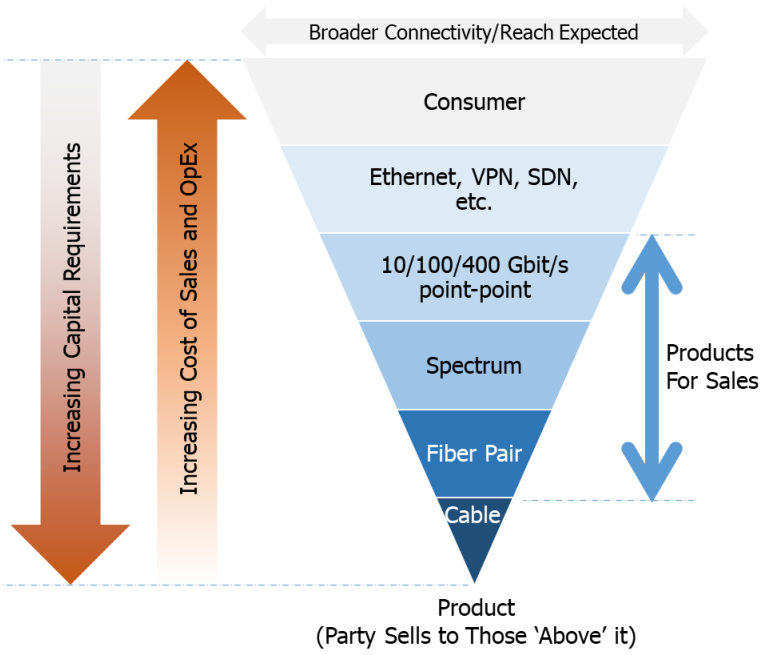

Figure 4: tiering of services in a telecommunications market

119. Even in the small marketplace that exists in the Cayman Islands, there is complexity among the various elements that comprise the overall telecommunications marketplace. Figure 4 shows some of these services and how they can be viewed as being tiered in the sense that higher-level services depend on the lower-level services.

120. Different companies participate in the market in different ways and with different combinations of service offerings. For example, what we call a "carrier" (e.g., C&W) was designed in years past to provide end-user services to residences and businesses. (The carrier model also favours a low competition environment with regulation taking the place of a robust marketplace.) Behind the scenes, carriers invest in and operate a variety of the operations necessary to operate as a carrier. Sometimes, the carrier owns these services, sometimes they outsource them. As perceived by the customer, the difference is irrelevant.

121. Hence, carriers do not invest in undersea cables to make a profit (unlike a "carrier's carrier"). Any investment required is a means-to-an-end to offer service. The undersea investment also is "subsidised" by the profits in the service offering part of the business. That is, the business case for an undersea cable does not need to stand on its own. Furthermore, the offering of a wholesale service based on the cable is not in the mindset of the carrier.

The role of Submarine Cables in the Marketplace

122. Although this business case focuses on the availability of undersea cables, the construction of an undersea cable is neither a single commercial transaction, nor is it enough to be able to offer the services to Cayman Islands' residents and businesses.

123. As shown in Figure 5 below, the central agreement to construct an undersea cable, usually a Joint Build Agreement – JBA, requires many additional agreements to be formed with all the parties involved. Notably, this includes various parties at the cable landings that will operate the cable landing stations and arrange to deliver the traffic to important points-of-presence.

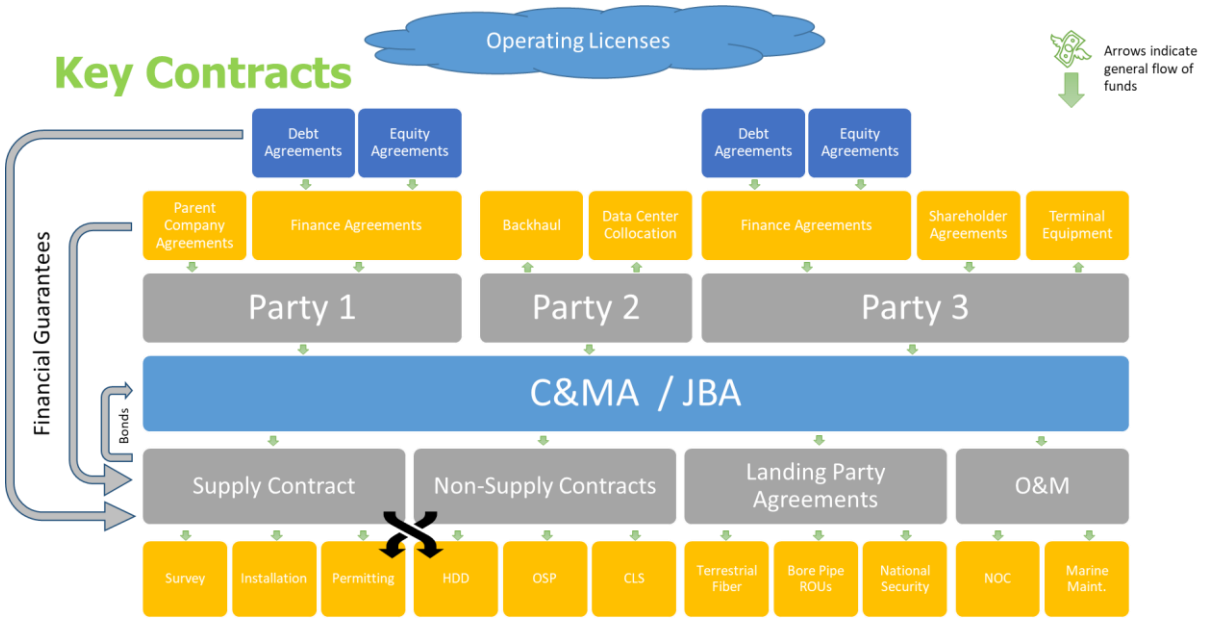

Figure 5: agreements between parties involved in subsea cables

124. Once all of the pieces for constructing a cable are assembled, the only service that can be offered is the ability to connect a cable landing station (CLS) with another CLS. Two additional elements are still missing.

125. First the operations of the new asset must be planned and executed. If the undersea cable is dedicated to the service of the Cayman Islands, an organization must be assigned the role of operator. This will require at least the following elements:

- Cable station maintenance
- Cable Station staffing
- Marine maintenance for the cable (the largest expected expense)
- Legal and regulatory filings
- Technical support and upgrades for the transmission equipment
- Optionally, commercial activities to sell capacity to new customers and to maintain contracts with the cable's users.

126. On the basis of the economies of scale, there is a strong case to be made that any new cables should be operated by an organization with other cables under management.

127. Second, the CLSs need to be connected to somewhere useful for providing the desired connections to the rest of the world. In the Cayman Islands, the CLS may serve double-duty as a Point-of-Presence (PoP) to exchange traffic with interested parties on the island. However, at the other end of the cable, there needs to be a connection or connections to locations of traffic exchange. This requires the ability to light dark fibres and/or obtain advanced services at commercially appealing rates. Fortunately, [redacted] has many fibre routes available as desirable PoPs [redacted] within a reasonable distance. In a good PoP, services ranging from Direct Internet Access (DIA), to VoIP traffic exchange[13], SD-WAN, access to the AWS/Azure/Google/IBM/Oracle clouds, etc. are available at from multiple providers to obtain the best prices.

Marketplace for International Wholesale Capacity

128. The term "wholesale capacity" means different things to different market participants. As used here, the term is used to distinguish the transport of a data stream from any added services. Hence, wholesale capacity will be delivered in a time-division-multiplexed format, i.e., not a packetized service that requires switching and/or routing.

129. Delivery of wholesale capacity is delivered according to many standards[14]. This wholesale capacity would be used by third-party service providers to offer services of their own.

130. The only facilities that exist to offer international connectivity to the Cayman Islands belong to LLA. As expected, representatives of LLA would not describe for this report the services that they provide to other Cayman Island carriers.

131. Hence, international wholesale capacity is provided by a single provider. Though LLA has stated that it has the technological means to increase the capacity on the undersea cables, market forces do not seem to be sufficient to motivate this activity. We speculate that the following factors contribute to the lack of motivation:

- LLA derives their revenue and profit from the sale of services to its customers. The sales of international wholesale capacity to others would enable competitors to thrive and to compete favourably with LLA.
- The cost of undersea infrastructure is small compared to the overall infrastructure that LLA uses to supply its services. LLA is not motivated to offer services on the undersea facilities at a price that is related to the cost of the facility. From LLA's point-of-view, the unbundling of the activities overseas, undersea, and domestically in the Cayman Islands is not in their interest as they have, internally, engineered network and its costs to offer their services as they are priced today.

Marketplace for Internet Services

132. Internet services in the Cayman Islands are offered by at least the four companies described above. (Others may offer additional, specialized services to, for example, the hospitality or

[13] i.e. Session Initiation Protocol (SIP) termination.
[14] These include (in order or the oldest legacy formats to the more modern ones): T1, E1, SONET (OC1, OC3, OC12, OC48, OC192), SDH (STM-1, STM-4, STM-16, STM-64), and OTN (OTU1, OTU2, OTU2e, OTU3, OTU4).

banking sectors.) All four companies have widespread usage and offer residential and business solutions. The government has also deployed a few Wi-FI hotspots to provide “economic relief.”[15]

133. As in most places in the world, the high speed internet that is available in the Cayman Islands costs more as the speed increases. It is not surprising, therefore, that FLOW and others offer 200 Mbps internet and download speed at up to 500 Mbps.

134. To understand whether these services are offered competitively fast and at competitive rates, we relied on surveys conduced by BVA BDRC and provided by cable.co.uk. In their 2021 survey[16], the Cayman Islands were ranked for speed of access 27th of the 224 counties and territories surveyed. No Caribbean Island is ranked higher. Overall, the speeds available across the Caribbean nations ranked in the middle of the regions defined in the study. Regionally, Western Europe and North America ranked the fastest speeds. Africa ranked lower.

135. However, the speeds available in the Cayman Islands come at a cost. In their fifth annual ranking in 2022, the survey found that the “average cost of a monthly internet package” in the Cayman Islands was the 10th most expensive in the world. Four Caribbean countries rank in the top ten most expensive countries to get internet service.[17]

[15] OfReg coordinated the effort and made use of equipment donated by Cisco.
[16] https://www.cable.co.uk/broadband/speed/worldwide-speed-league/
[17] The other Caribbean countries are the British Virgin Islands, Turks & Caicos Islands (British Oversea Territory), and Haiti. Note that 3 of the four Caribbean counties in this top ten list are British Overseas Territories.

F. Demand

136. When designing a new submarine connectivity solution for the next two or three decades, assessing the international bandwidth demand is a key step in the process[18]. The volume of traffic demand will help to identify the type and technology of submarine cable connectivity to develop and deploy on Day One, while the knowledge of the demand growth rate is useful to ensure the selected technical solution will be able to cope with the increase in international bandwidth demand forecasted over the next 20 years. In this section, the traffic demand (or bandwidth demand) will be expressed in bit/s, i.e., the transfer rate for moving data (made of bits) from Point A to Point B. Given its magnitude, Cayman Islands traffic demand will be expressed in giga bit per second, or Gbit/s (i.e., billion of bits per seconds).

Nature of the International Bandwidth Demand

137. Traffic demand is typically made of four main components, whose relative importance depends on the location, size, and level of socio-economic development (including presence of digital infrastructure and tech activities) of the country under study.

- **Enterprises**

  This traffic demand is mostly concentrated during the working hours, with many people connected to Internet, but with applications requiring a small or modest amount of data to be exchanged. The main industries in Cayman Islands are financial services, real estate sales and development, and tourism. The first two ones (financial services and real estate sales and development) require little bandwidth. The data required to support financial services is typically 10,000 smaller than the capacity required to watch a HD video.

  Prior to COVID outbreak, the number of international tourist arrivals in Cayman Islands was about 2.2m between 2015 and 201919. About 77% of these 2.2m corresponds to one-day visitors, while 502,739 overnight visitors in 2019 spent more than one day in Cayman Islands. It is reasonable to assume than the 1.7m same-day visitors do not spend a significant amount of time in Cayan Islands using internet and cloud bandwidth-intensive services. These one-day visitors may share photos or short videos during their visit, but this will require modest bandwidth requirements (the amount of data for a typical smart phone photo is typically 1,000 times smaller than for a HD movie). Furthermore, these one-day visitors will use access to internet during their visit, that is to say mostly during working hours. The bandwidth requirements from the same-day visitors will not fall during the peak hours, when the bandwidth requirements are the largest.

  Assuming one-week stays, the 502,739 overnight visitors are similar to an average increase in the number of persons in Cayman Islands of about 9,600 people, i.e., a 15% increase compared to the Cayman Islands population size20 21.

- **Internet End-Users**

  Residential end-users are using a variety of connected devices allowing them to be online most of the time and use numerous services to order a cab, listen to music, shop online, watch videos or TV, order food, share videos, check their finance, work or learn from home. The development of more bandwidth-hungry applications and the wider adoption by

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[18] Depending on the ownership structure, competitive environment, and technology innovation on the route served, the decommissioning of a subsea cable system can happen anytime between 6 years (example of the trans-Atlantic Gemini cable system that entered in commercial service in 1998 and was phased out in 2004) and 25+ years. In most markets, cable system decommissioning is triggered by the end of the economic lifetime, which is typically shorter than the so-called 25-year technical lifetime. This economic lifetime depends on, among other things, the competitive landscape. If we assume that there will be no more than one eastward cable and one westward cable connecting Cayman Islands to North America in 20 years, the economic lifetime can be extended to 25 or 30 years (depending on the bandwidth demand at the time and the technical health/status of the cable systems).

[19] https://data.worldbank.org/indicator/ST.INT.ARVL?locations=KY

[20] https://caymannewsservice.com/2020/01/visitor-numbers-reach-historic-highs/

[21] https://www.visitcaymanislands.com/statistics/biannual2018/index.html#page12 indicates an average length of stay in 2018 of 6.1 days

residential end-users of cloud-based services (like storage and computing), requiring to constantly move massive amount of data worldwide to make any updated content available to all users, whatever their location, represent significant drivers in the growth in international bandwidth demand, all the more than a lot of the services described above require connectivity to servers or users located outside the Cayman Islands.

- **Machine to Machine and Internet of Things (M2M-IoT)**

  Machine to Machine and Internet of Things (M2M-IoT) is the traffic that is generated by a device itself:

  - **Machine to Machine (M2M) traffic**

    Direct communication or an exchange of data between at least two devices, typically without the need for a human interface or human intervention.

  - **Internet of Things (IoT) traffic**

    Devices are typically very specific or serve a narrow purpose, and are connected to the internet and typically communicate data to and from an end-user.

    Both M2M and IoT data can be present in manufacturing environments, smart homes, smart cars, health care devices, and anywhere automation is possible. Each M2M-IoT device consists of an innumerable number and type of applications. Common examples may include checking for updates, sending meta-data, sending automated reports, controls and feedback systems (like a thermostat), security/surveillance, and car automation (e.g., self-driving and navigation).

    Although the number the number of M2M-IoT connected devices is forecasted to become very large, each M2M-IoT connection requires, however, a very small capacity22. The average amount of data transmitted per M2M/IoT device per year is estimated to be about 20 GB in 2022 (corresponding to an average bandwidth of 635 bit/s). In addition to this, the number of M2M-IoT connected devices that require an international connection to, e.g., North America or trigger a type of sync event that would cause bandwidth to be consumed with North America, is very small (put another way, we do not expect a smart fridge in Cayman Islands “talking” much to North America).
    As a result, previous market analysis in other regions by Pioneer Consulting have shown that M2M-IoT demand has a negligible influence on total international bandwidth demand, as very small amount of data is expected to be stored outside the country under study for this traffic category.

- **Data Centre Interconnect (DCI) and Server Interconnect**

  The digital contents, applications, data, and services used by enterprises and residential users are made up of millions of ones and zeros (bits or binary digits) that live on a physical server in a physical location. This physical location can be in-country (e.g., in local data centres or servers installed in local Internet Service Provider – ISP – networks) or outside the country (in regional data centres installed in neighbouring or distant countries). When a Cayman-based residential end-user requests a content (e.g., a video) that is stored outside the country, this content will be moved to the Cayman Islands via international submarine cable connectivity.

  Popular contents (like viral videos on social networks) will be locally stored in a caching location, which is physically a server installed either in a local edge data centre or within an ISP network. International submarine cable connectivity is also required here to pre-position these most popular contents in caching locations in Cayman Island. Doing so relies on the utilization of some international bandwidth to move the required data from, e.g., US-based data centres to servers installed in Cayman Islands. This traffic, not directly seen by (or delivered to) the end-users can be named back-office traffic. For countries or regions where

[22] https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.html

many data centres are built, this back-office traffic can represent a very high share of the total international traffic (more than 80% between, for instance, USA and west Europe).

Traffic Direction

138. Network traffic is often described as either ‘upstream’ or ‘downstream’ traffic.

- **Upstream traffic** refers to data that is sent from a computer, a mobile device, or any connected device. This includes all types of outgoing data, such as sending an e-mail message or uploading a file. It may also include data sent over the Internet while playing an online multiplayer game.
- **Downstream traffic** refers data that is received by a computer, a mobile device, or any connected device. This includes receiving e-mail messages, downloading files, video streaming, or simply visiting Web pages. Online games also generate downstream traffic.

139. Filesharing applications (like BitTorrent) are bidirectional and generate both downstream and upstream traffics. Social networking applications can be also bidirectional (e.g., watching a video on Facebook – downstream traffic – and uploading a video to Facebook – upstream traffic).

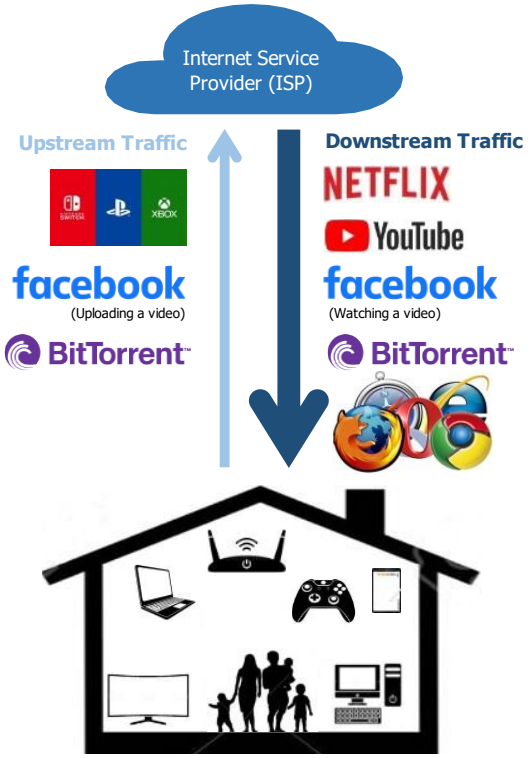


Figure 6: upstream and downstream traffics for residential end-users

140. Since the beginning of the internet, residential broadband traffic has been asymmetric in nature, as users generally receive far more information (streaming for instance) than they send (uploading videos to Facebook for instance). In other words, residential customers were primarily consumers, not producers, of information.

141. While video conferencing was growing anywhere from 300-700% over its pre-lockdown levels, that traffic still accounts for less than a few % of overall network traffic. Over the next decades, our eyes and ears will continue to consume more data over the Internet than our mouths and fingers can produce. Overall consumption of broadband has been and will continue to be significantly asymmetrical, with a downstream traffic approximately 15 times larger than the upstream traffic[23].

[23] https://www.ncta.com/whats-new/downstream-traffic-still-dominates-our-lives

Peak Hours

142. Bandwidth needs for businesses are modest compared to needs for residential customers. We have seen above that the volume of data required to support a financial service or transaction is typically a few 10s of kilobytes. Video conferencing tools require only 1 to 2 Mbit/s capacity, compared to 15 to 25 Mbit/s for ultra-HD (4K) videos or game streaming services. In addition to this, some of the most bandwidth-intensive business applications (like data mirroring) are planned in the off-peak hours.

143. Figure 7 below shows that the peak in Internet traffic in a typical weekday is not driven by the number of people at work or the number of devices used during the work hours[24]. The chart overlays the average number of people reporting to be working at each point in the day along with reported device use (whether desktop computer, laptop, smartphone, or tablet). The time and rate of change in internet use appears to coincide with working and device use during the morning hours. The 18:00 drop reflects the end of the working day while the 9pm peak correspond to end-users using their devices for spending some time online. The fact that the number of devices used is lower at 9pm peak than during the working hours means that the share of internet users online in the evening is far from 100% (it is about 30-35% in the developed countries). Because a significant share of the end-users at peak hours uses bandwidth-hungry applications (like video streaming or online gaming), the Internet traffic is higher in the peak hours that the one caused by the entire population at work during the day.

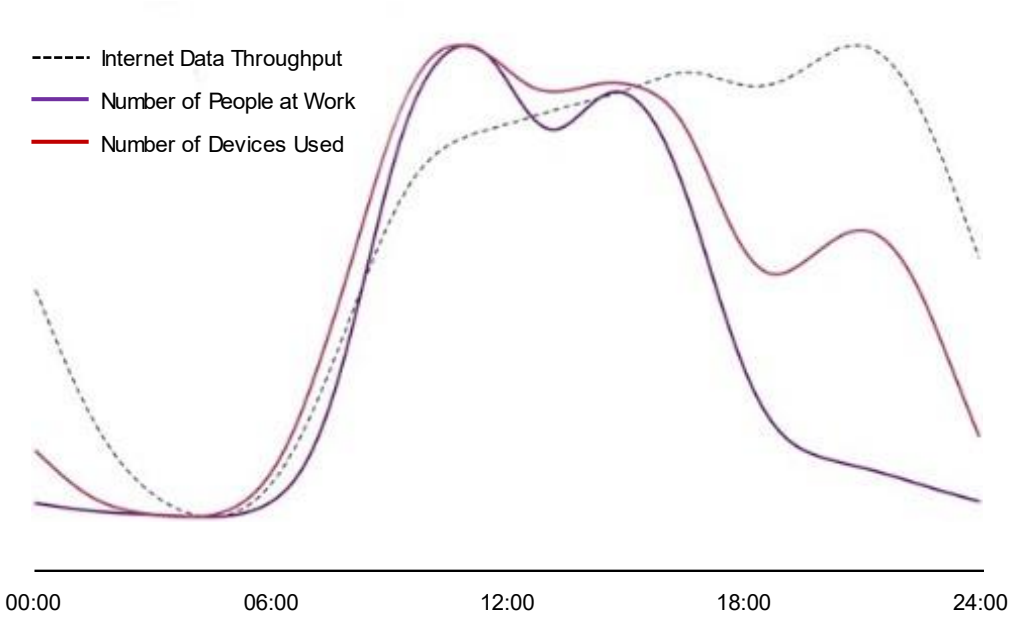


Figure 7: Internet traffic in a typical weekday in the UK

144. Even if the daily traffic time profile has been somewhat impacted by the COVID-19 pandemic, and despites the development of remote working and education, multiple reports show that peak hours still remain in the evening, after people leave work. The exact peak hours may depend on the location, but they lie typically between 19:00 and 22:00 or between 20:00 and 23:00.

145. Figure 8 below shows traffic statistics in the New South Wales IXP operated by the Internet Association of Australia[25].

[24] https://datasciencecampus.ons.gov.uk/projects/what-can-internet-use-tell-us-about-our-society-and-the-economy/
[25] https://metrics.ix.asn.au/d/000000053/ix-aggregates?orgId=2&refresh=1m&viewPanel=14

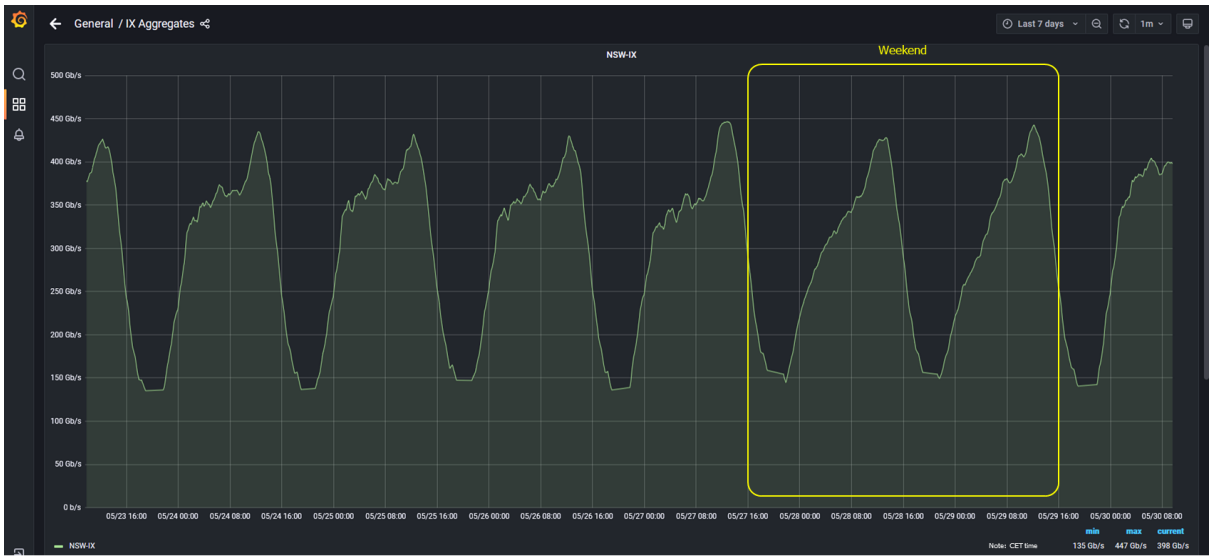


Figure 8: May 23-30, 2022, daily traffic pattern in NSW IXP (Australia)

146. In the weekdays, the traffic pattern exhibits a peak between 19:00 and 23:00, while a strong shoulder can be observed between 10:00 and 16:00, with a secondary peak around 14:00. In the weekends, the daily traffic pattern is more triangular pattern, with a peak hour on Sundays slightly ahead of the Fridays and Saturdays (but like the other days). The off-peak hour traffic represents about one third of peak hour traffic (mostly made of machine-to-machine traffic).

147. Traffic pattern may slightly vary across regions. Figure 9Figure 9 represents the daily pattern for the traffic volume monitored in the Internet eXchange Point (IXP) of JPIX in Osaka, Japan[26]. The peak hours are still in the evening, but Saturdays and Sundays exhibits stronger shoulders than the weekdays.

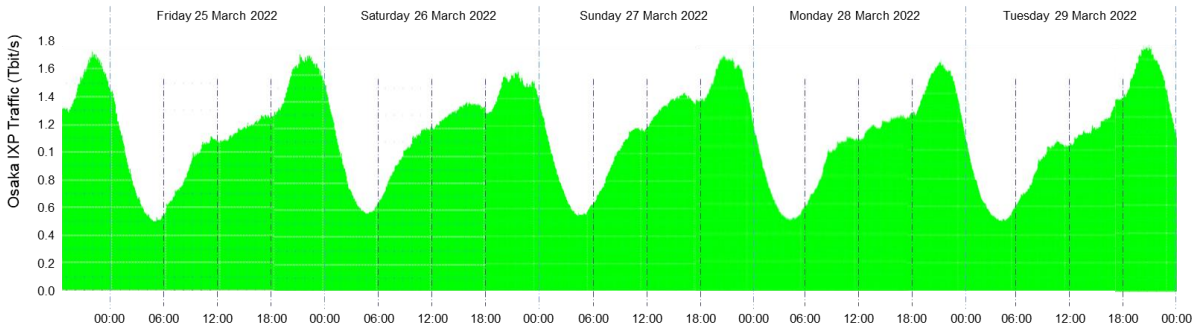


Figure 9: Traffic in the Internet eXchange Point (IXP) of JPIX in Osaka, Japan

148. Closer to the Cayman Islands, Figure 10Figure 10 depicts the daily pattern for the traffic volume monitored in the Internet eXchange Point (IXP) in Curaçao Island operated by AMS-IX, a neutral member-based association that operates multiple interconnection platforms around the world[27]. The daily traffic pattern looks like the one observed in Japan, with strong shoulders on Saturdays and Sundays (in the afternoon, when people spend some time online) and peak hours in the evenings.

[26] https://www.jpix.ad.jp/en/technical_traffic.php
[27] https://www.ams-ix.net/car/documentation/total-stats

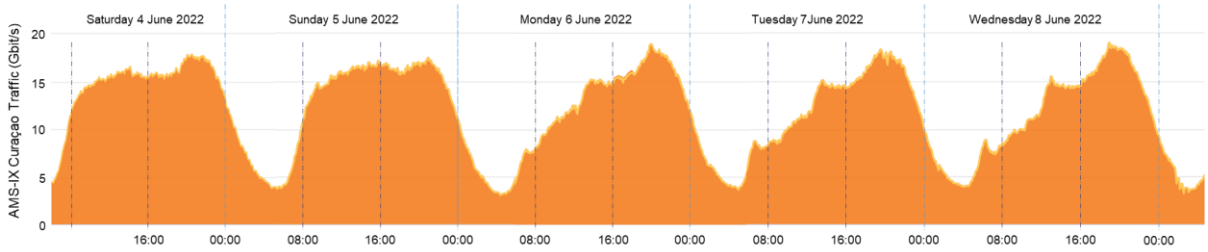


Figure 10: Traffic in the Internet eXchange Point (IXP) of AMS-IX in Curaçao

149. Figure 11 below zooms in on the daily traffic pattern during a weekday (Wednesday 8 June 2022) in Curaçao Island. The daily pattern exhibits a triangular profile, with a peak at 07:00 when people start their day and another peak at 13:45 before people go back to work or school. The peak hours in the evening are between 19:00 and 22:00. This is a further confirmation that the peak traffic demand is driven by residential users in the evening when they are connected to Internet and use some bandwidth-intensive applications.

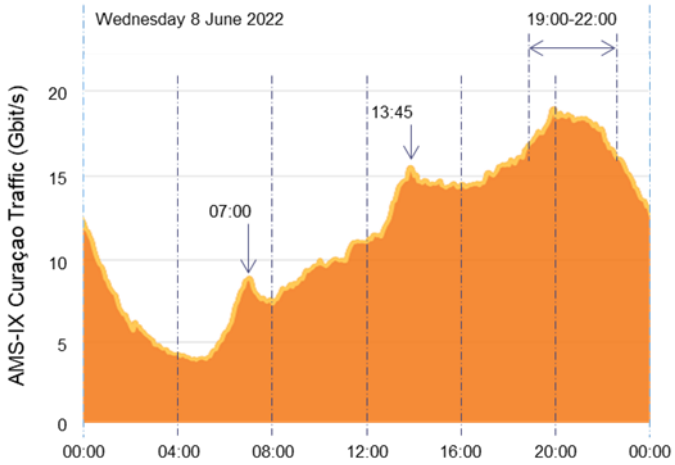


Figure 11: Daily traffic pattern in the Internet eXchange Point (IXP) of AMS-IX in Curaçao

150. From the previous four figures, it looks clear that the peak in Internet traffic in a typical weekday is not driven by the number of people at work or the number of devices used during the work hours, but by the number of devices used after work for capacity-hungry applications (like video streaming and gaming). As a result, residential customers' bandwidth needs in the peak hours surpass businesses' bandwidth needs at any time of the day and is the metric to be used for dimensioning the backbone infrastructure.

Peak Traffic Demand and Communications Infrastructure Sizing

151. Communications infrastructure is typically sized according to peak demand. That is to say communications infrastructure must be able to handle the maximum throughput (either upstream or downstream) anticipated, even if for only a very short timeframe (a few hours), per day. Most communications infrastructure operates therefore well below peak loading for most of the day. Based on the previous sections, the residential Internet end-user demand represents the predominant source of traffic demand in the peak hours, with the downstream traffic (e.g., watching a video) about 15 times larger than the upstream traffic (e.g., uploading content).

Assessing Traffic Demand at Peak Hours

152. Four sources/methodologies have been used to estimate the 2022 international bandwidth demand required by the Cayman Islands. Supported by previous market analysis and due diligence work assignments in Central America and the Caribbean region, Pioneer Consulting has assumed that the international traffic is heavily hubbed to the USA, and more explicitly to [redacted] where large contents are located, and cost-effective internet exchange is available in several connectivity-rich environments.

153. Because some of the sources used by Pioneer Consulting have zero data about Cayman Islands international bandwidth demand, the international bandwidth demand of similar or neighbouring islands have been assessed for comparison/referencing purposes.

i. TeleGeography Data

TeleGeography is a telecommunications market research firm delivering forecasts of international bandwidth demand for over 170 countries (but not the Cayman Islands) and on some specific busy routes[28]. TeleGeography's data was used to assess the international bandwidth demand for Bahamas, Barbados, Cuba, Dominican Republic, Grenada, Haiti, Jamaica, and Trinidad and Tobago.

ii. **ITU-T Data**

ITU-T's World Telecommunication/ICT Indicators Database provides telecommunication/ICT statistics for over 200 economies data[29]. ITU-T's data was used to assess the international bandwidth demand for Antigua, Barbados, Cayman Islands, Cuba, Curaçao, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Lucia, Saint Vincent and Grenadines, and Trinidad and Tobago. For some of these countries, only old data was available and had to be extrapolated to get international bandwidth demand in 2022 (including for Cayman Islands, for which only 2015 and 2016 data was available in ITU-T's database).

iii. **Simplified "Bottom-Up" Study**

This approach is based on the typical average Internet consumption volume per end-user, as driven by the speed of the fixed and mobile access networks. From previous bandwidth demand analysis work assignments, Pioneer Consulting has built a simple correspondence table linking the average Internet access speeds to the average bandwidth used by Internet end-users in the peak hours (the higher the speed of the access networks, the more prone the end-users to use very bandwidth-intensive applications).

By considering the size of the population, the share of the inhabitants who are Internet users, the share of the Internet users who are online during the peak hours, the average Internet end-user traffic per user online at peak hours, and the share of content located in [redacted] Pioneer Consulting has assessed the international bandwidth demand for Antigua, Aruba, Bahamas, Barbados, Bermuda, BVIs, Cayman Islands, Cuba, Curaçao, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Lucia, Saint Vincent and Grenadines, Trinidad and Tobago, Turk and Caicos, and US vIs.

iv. **Approach Based on GDP per capita**

Gross Domestic Product (GDP) per capita is a core indicator of economic performance and commonly used as a broad measure of average living standards or economic well-being[30]. From previous bandwidth demand analysis work assignments, Pioneer Consulting has built a simple correspondence table linking the GDP per capita to the average bandwidth per inhabitant in the peak hours (the higher the GDP per capita, the more likely the Internet access speeds is to be high, and the more prone the end-users to use very bandwidth-intensive applications).
By considering the size of the population, the average GDP per capita, and the share of content located in [redacted] Pioneer Consulting has assessed the international bandwidth demand for the countries listed for the approach #3 (Simplified "Bottom-Up" Study).

154. The estimated bandwidth demands between the countries listed above (including the Cayman Islands) and [redacted] are obtained by averaging the figures obtained by the four approaches described above and are provided in the table below.

[28] https://www2.telegeography.com/?hsLang=es
[29] https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx
[30] https://www.oecd-ilibrary.org/docserver/na_glance-2013-5-en.pdf?expires=1654796202&id=id&accname=guest&checksum=3F2DF3FD96E645381A91960857DBBAB4

Table 2: estimates of international bandwidth demand with the US (2022)

Country	Total (Gbit/s)	Per Capita (kbit/s)
Anguilla	5	309
Antigua	23	236
Aruba	95	880
Bahamas	119	297
Barbados	129	449
Bermuda	46	750
BVIs	20	666
Cayman Islands	[redacted]	[redacted]
Cuba	646	57
Curacao	48	290
Dominica	19	259
Dominican Republic	1,389	126
Grenada	30	268
Haiti	259	22
Jamaica	325	109
Saint Lucia	64	343
St Vincent and the Grenadines	34	303
Trinidad and Tobago	287	204
Turks and Caicos	18	460
US vIs	78	746

155. Unsurprisingly, the international bandwidth demand per capita is extremely low in Cuba and Haiti. On the other side, the international bandwidth demand per capita estimated for the Cayman Islands is similar to the one in Aruba, Bermuda, BVIs, and US vIs. The international bandwidth demand between the Cayman Islands and USA, as driven the Cayman Islands population, is estimated to be [redacted].

156. This international bandwidth demand per capita in Cayman Islands is about 15% lower than the international end-user bandwidth demand per capita in some very developed areas in Europe offering for some of them average Internet access 2 or 3 times faster than the one in Cayman Islands[31].It was observed in the section reviewing the four components of traffic demand that the 502,739 overnight visitors in 2019 corresponded to an average increase in the number of persons in Cayman Islands of about 9,600 people, i.e., a 15% increase compared to the Cayman Islands population size. These overnight visitors will use international bandwidth to share photos/videos and watch videos in the peak evening hours on the top of the international bandwidth used by the Cayman Islands population. As a result, the TOTAL international bandwidth demand between the Cayman Islands and USA is estimated to be [redacted]

157. The [redacted] figure is consistent with

[31] Pioneer Consulting is currently working, or has recently worked, on market studies in several highly developed economies, with access to the actual international capacity driven by Internet end-users' demand.

- The [redacted] peak bandwidth demand figure in Logic's network shared during the meeting held on 11 May 2022 (Logic claimed to transport the largest capacity in Cayman Islands over its network. In the absence of data/statistics from the local regulator, [redacted]
- The [redacted] bandwidth on the MAYA-1 cable system between the Cayman Islands and USA, figure shared by Cable & Wireless during the meeting held on 1 June 2022. Although the question was not explicitly asked, it is believed that the [redacted] bandwidth figure corresponds to the lit capacity supported by MAYA-1 between the Cayman Islands and USA, i.e., a figure larger than the capacity actually used by (and sold to) customers).

158. In addition to the four approaches described above, Pioneer Consulting has developed a detailed bottom-up traffic demand analysis, starting by the development of an Internet end-user profile. An Internet end-user profile represents the percentage of internet users using each of all the applications and services at a given time during the peak hours (when the traffic demand peaks). End-user profiles are developed for fixed broadband and mobile broadband connections to Internet, as the most popular applications and services depend on the type of connected device that is used. Next, the bandwidth (expressed in Mbit/s) required on a per application basis has been estimated (e.g., watching an ultra-high definition (4K) video on Netflix requires the download transfer of 7 GB (giga bytes) of data per hour, corresponding to a capacity of about 7,000 x 8 Mbit / 3,600 seconds = 15.6 Mbit/s). Finally, Pioneer Consulting has developed a 3rd set of data, which evaluates where data is located on a per application basis (e.g., for Cayman-based end-users, YouTube video content is stored partly in data centres located in the USA, and partly in caching servers hosted by ISPs in their network). More generally, the part of the digital content consumed by the Cayman Islands that is not locally stored is assumed to be originating from the USA[32]. Combining all this data provides the average Internet end-user downstream bandwidth requirement during peak hours for data requested from the USA. The forecast of the future bandwidth demand growth is built based on the demographic evolution of the Cayman Islands, the development of access to faster Internet connections, and the introduction of more bandwidth hungry capacity services,

159. [redacted] the usage of Internet in the Cayman Islands, several assumptions have been made by Pioneer Consulting, using its industry knowledge and similar economies as proxies. The detailed bottom-up traffic demand analysis leads to a figure of [redacted] for the international bandwidth demand for the Cayman Islands population (equivalent to [redacted] for the entire demand including the overnight visitors).

160. The [redacted] figure is the estimate for the international capacity used by Internet end-users during the evening peak hours. The international capacity actually purchased by Cayman-based telcos and ISPs is likely to be larger due to upgrade lead-time to meet bandwidth planning requirements, contract structure that may favour long-term purchase of bandwidth or higher volume, and granularity of the international bandwidth as offered in the cable landing station (an ISP needing 6 Gbit/s of international bandwidth may have to buy a 10 Gbit/s circuit because the international capacity product may not be offered with a 1 Gbit/s granularity).

Assessing Traffic Demand Growth

161. International bandwidth demand growth will depend on the demographic evolution of the Cayman Islands, the development of access to faster Internet connections, the introduction of more bandwidth hungry capacity services, the development of local tech industries, and the evolution of the regional telecommunications market, including the evolution of the content delivery chain (e.g., development of caching locations and edge data centres in the Cayman Islands).

162. Using international traffic demand forecast from the market research firm TeleGeography for a group of regional economies (Bahamas, Barbados, Dominican Republic, Grenada, Jamaica, and

[32] This is supported by discussions between Pioneer Consulting and organisations operating transmission networks in Central America and the Caribbean area.

Trinidad and Tobago), Pioneer Consulting estimates that the international bandwidth demand Compound Annual Growth Rate (CAGR) will be about [redacted].

163. The model developed for the bottom-up traffic demand analysis was fed by time profiles for the key parameters governing the capacity demand from the Internet end-users. The most likely scenario results in an international traffic demand growth rate of about [redacted] between 2022 and 2047 (i.e., +25 years). This [redacted] figure is comparable with the past growth rate for the Internet traffic user for European end-users between 2010 and 2019[33]. The [redacted] figure is also consistent with the evolution of mobile data traffic per smartphone [redacted] forecasted by Ericsson in North America and Western Europe between 2021 and 2027 ([redacted] and [redacted], respectively)[redacted].

164. The traffic growth forecast relies on several assumptions, including when the initial uptake of XR-type services, including AR, VR and Mixed Reality (MR), will happen. If adoption is stronger than expected, traffic demand could increase more than currently anticipated over the forecast period. Also, the capacity used by filesharing and storage applications are functions of available bandwidth, so are depending on the time evolution of the speed of access to Internet via fixed or mobile networks.

165. A [redacted] for the international traffic demand (as driven by Internet end-users during peak hours) associated with a [redacted] demand in 2022 (including the overnight visitors) will lead to a required international capacity between USA and the Cayman Islands of about [redacted] in 2047. This capacity can be supported by a single fibre pair of any cable system designed, engineered, and built using 2022 technologies.

[33] https://blog.apnic.net/wp-content/uploads/2021/12/MKGRA669-Report-for-APNIC-LACNIC-V3.pdf
[34] https://www.ericsson.com/en/reports-and-papers/mobility-report/dataforecasts/mobile-traffic-forecast

G. Critical Success Factors

166. A project's Critical Success Factors (CSFs) can be defined as crucial attributes for the successful delivery of the project. Conceptually they can be seen to act as a bridge between high-level project objectives, and specific requirements for the preferred option that will be taken forward. Development of CSFs therefore requires an interpretation of the project objectives to be undertaken.

Interpretation of project objectives and identification of Critical Success Factors

167. In Section D of this Strategic Case, three project objectives are defined. These are:

- To assure continuity and resilience of data connectivity for current and future needs, and to underpin inward investment.
- To provide data capacity to meet background growth trends and support further economic growth in both existing and new sectors, notably the digital sector.
- Ensure affordability, choice and innovation in the Cayman Islands' ICT market, to support digital inclusion and social / economic participation, as well as tourism.

These project objectives have been interpreted by the project team to identify five CSFs for the project, as set out in the discussion below.

Objective 1

168. The first of the three objectives requires that the project assures both continuity and resilience of data connectivity. This gives rise to the first two CSFs that have been interpreted from the project objectives:

- The requirement for **assurance of continuity** has been interpreted to mean that the CIG must be confident that pursuing its preferred option will ensure that the Cayman Islands do not lose connectivity, even if the existing cables are decommissioned. In practice, this means the CIG must be confident if it chooses to pursue a solution, that that solution will be deliverable within reasonably certain and not protracted timescales, and will lead to a new subsea cable. It also means that CIG must be confident that continuity will be maintained for the full duration of the project.

  Following discussions with representatives of CIG during work at OBC level, it is assumed in developing this CSF that this requirement extends to all three of the islands that comprise the Cayman Islands: Grand Cayman, Cayman Brac and Little Cayman.

  Options that do not deliver this assurance cannot therefore deliver the project objectives.

CSF1: continuity

CIG must be confident that the preferred option will deliver digital connectivity within reasonably certain and not protracted timescales, and that this must endure for the life of the cable.

- The requirement for **assurance of resilience** can be interpreted in various ways, largely because of the significant number of ways that the concept of 'system resilience' can be defined[35]. Broadly, the resilience of a system or systems can be considered its ability to withstand negative events, and can be categorised by cable resilience and service resilience. Service resilience is outside the scope of this project and is included within the dependencies and constraints chapter. In the case of international connectivity for the Cayman Islands, negative events would be those that lead to an outage of one or more of the cables (either due to failure of the submerged cable, failure ofthe transmission equipment / connections at either end, or failure by the operator to provide a service). For the purposes of this analysis, a straightforward and clear approach is used to assess the level of resilience introduced by

[35] There has been various academic literature around the different ways in which system resilience can be defined. See for an overview Hosseini et al, *'A review of definitions and measures of system resilience'*, Reliability Engineering and System Safety, Vol 145, January 2016

each option, and consistent diagrams have been created to illustrate different possible scenarios.

[redacted]

[redacted]

[redacted]

- [redacted]

[redacted]

  - [redacted]

- [redacted]

- [redacted]

[redacted]

- The requirement that the preferred solution underpins inward investment can also be interpreted in several ways. Three distinguishable effects of a new cable have been identified that could lead to inward investment:

  1. A new cable will increase resilience, reducing connectivity outages against a 'do nothing' scenario. This is likely to support and grow the economy, by avoiding the economic and financial costs associated with outages.
  2. Individuals and businesses will know that there are likely to be fewer connectivity outages and that the short-term risk of the Cayman Islands becoming dependent upon a single international connection has been mitigated, and will plan accordingly, potentially increasing their propensity to invest.
  3. Individuals and businesses may interpret a move by the CIG to invest to assure the continued connectivity and resilience of the Cayman Islands to signal the CIG's commitment to the Cayman Islands as a digitally-enabled economy, that places high value on high quality and efficient digital infrastructure. This may change stakeholders' perceptions about the future, and investment decisions that they may consequently make.

  It is likely that any intervention in the market will lead to all three of these effects occurring, and it is therefore considered that no CSF related to this requirement is necessary. The possible economic benefits of (1) and (2), however, are assessed in Sections E and F of this Economic Case. It has not been possible to quantify the extent of effect (3) in work to develop this OBC given the highly uncertain nature of any such effect.

Objective 2

169. The second project objective is:

- To provide data capacity to meet background growth trends and support further economic growth in both existing and new sectors, notably the digital sector.

The requirement that the preferred solution provide data capacity to **meet background growth trends and support further economic growth in both existing and new sectors** is considered in the initial sifting of options in the Strategic Case. As set out in the Strategic Case, it is considered that any new subsea cable could deliver the requisite capacity, and a separate CSF is therefore not required.

Objective 3

170. The third project objective is:

- Ensure affordability, choice and innovation in the Cayman Islands' ICT market, to support digital inclusion and social / economic participation, as well as tourism.

This gives rise to the third, fourth, and fifth CSFs that have been interpreted from the project objectives:

- The requirement in the project objectives to ensure **affordability**, choice and innovation in the Cayman Islands' ICT market in the project objectives can be considered together as all three are limited in the Cayman Islands' ICT market at the moment. As discussed in the market review set out in the Strategic Case, a significant cause of these limitations appears to be the market failure arising from the naturally monopolistic nature of the international digital connectivity market for the Cayman Islands.

  The first CSF arising from this objective is therefore that the preferred options support the benefits of competition.

CSF3: Support the benefits of competition

The existing situation is perceived to be characterised by a lack of affordability, choice and innovation in the Cayman Islands' digital markets arising from the status of the market for subsea connectivity as a natural monopoly.

The preferred solution must support these factors.

As set out in the dependencies discussion in the Strategic Case, the affordability and choice of digital connectivity for consumers and businesses is driven in part by the cost and availability of on-island digital infrastructure, which is beyond the scope of this project. In order, however, to support the reduction of cost to consumers and businesses of digital connectivity, a second CSF can be identified from this objective: that any new option should leave the subsea component of cost the same as or better than it would be in the absence of intervention.

CSF4: subsea costs

The preferred option should leave the cost of subsea connectivity the same as or better than it would be in the absence of intervention by CIG.

- The requirement to **support digital inclusion and social / economic participation, as well as tourism** within the objective are elements that predominantly relate to the affordability and accessibility of connectivity once a new cable has reached a landing station on Cayman, rather than the subsea infrastructure itself.

  One important aspect of this sub-objective, however, is highly relevant for the subsea infrastructure: the importance of inter-island connectivity. Discussions with CIG officials have indicated that CIG considers that digital inclusion and social and economic participation of particular importance across all three islands.

  The preferred options should therefore support digital connectivity across all three islands of the Cayman Islands. As described in the Strategic Case, radio connectivity is sufficient to ensure connectivity between Cayman Brac and Little Cayman (a distance of around 7.5km). New subsea digital infrastructure would, however, need to provide connectivity to both Grand Cayman and Cayman Brac.

  This requirement is further supported by the requirement to support tourism. Tourism — particularly that involving diving activities — is one of the primary areas of economic activity on both Cayman Brac and Little Cayman.

CSF5: Inter-island connectivity

Digital inclusion and the support of social and economic participation across all three islands in the Cayman Islands is important. Radio connectivity is adequate to link Cayman Brac and Little Cayman. **The project must provide new connectivity to Grand Cayman and Cayman Brac.**

171. Summarising the discussion above, the complete set of CSFs for the project is set out in Table 3.

Table 3: summary of project Critical Success Factors

Critical Success Factor	Commentary	Justification
1. Continuity	CIG must be confident that the preferred option **will deliver digital connectivity within reasonably certain and not protracted timescales,** and that this must endure for the life of the cable.	The project objectives require assurance of continuity.
[redacted]		
3. Support the benefits of competition	The existing situation is perceived to be characterised by a lack of affordability, choice and innovation in the Cayman Islands' digital markets arising from the status of the market for subsea connectivity as a natural monopoly. The preferred solution must support these factors.	The project objectives require the project to support digital inclusion and social / economic participation, as well as tourism.
4. **Subsea costs**	**The preferred option should leave the cost of subsea connectivity the same as or better than it would be in the absence of intervention by CIG.**	To support improved affordability for businesses and consumers, noting the wider dependencies that also affect delivery of this objective.
5. **Inter-island connectivity**	Digital inclusion and the support of social and economic participation across all three islands in the Cayman Islands is important. Radio connectivity is adequate to link Cayman Brac and Little Cayman. **The project must provide new connectivity to Grand Cayman and Cayman Brac.**	The project objectives require that the project support digital inclusion and social / economic participation.

172. The Economic Case of this OBC assesses whether each of the infrastructure options brought forward from this section deliver against the CSFs identified above.

H. System requirements

173. This section considers the Cayman Islands' requirements in light of the conclusions reached in Sections E, F and G above.

174. Looking at the current figures from the Demand section (and accounting for a CAGR of , when compared against the capacity carrying ability of modern submarine cables, it is not unreasonable to say that almost any new cable will be sufficient to satisfy the Cayman Islands' short to medium terms demands, and address the immediate resiliency concerns. In order to totally mitigate resiliency concerns around the retirement of the two existing cables, more than one new international connection is required.

175. As set out in Section B of this strategic case, there is no certainty regarding the status of existing subsea connectivity following the introduction of any new cable. This means that it is not certain that a new cable would be required to carry the entire demand from the Cayman Islands.

176. A common theme raised during the various stakeholder calls was the relatively high barriers to access in respect of availability of more granular, or smaller, levels of international wholesale capacity. While lower offerings such as 1Gbps which are not believed to be currently available, may be attractive to the marketplace, the provision of such options is largely agnostic to the system requirements as they are technically the sole provision of owners of the international capacity and enabled by the equipment configurations deployed terrestrially.

177. Breaking down the requirements of any new submarine link to the Cayman Islands, six key criteria were identified as critical to the success of the project:

i.

ii. Improved Pricing

Pricing in the Cayman Islands is currently dominated by Cable & Wireless, enabled by its CJFS ownership and exclusive landing rights for MAYA-1. Any new solution(s) should allow additional competition in the Cayman Islands telecoms market via the introduction of additional operators who have access to a portfolio of international capacity options, not just C&W.

iii. Capacity

As explained in the Demand section, capacity, while important, is not currently a major factor in designing or selecting a new submarine cable for Cayman Islands for two reasons:

- Firstly, the Cayman Islands capacity requirements are relatively moderate.
- Secondly, any new submarine cable will be able to deliver relatively extremely large amounts of bandwidth which will be able to accommodate future demand. Therefore, while it may appear overly reductive, in the current scenario "any new cable" will be sufficient to address capacity requirements.

While a single fibre pair appears likely to be adequate to service the needs of the Cayman Islands for the foreseeable future (particularly given that ongoing improvements to capacity from technological developments in transmittal equipment are expected to continue) , it is

assumed that a new self-build cable would include multiple fibre pairs — the costings in the Financial Case of this OBC assume six pairs. This is partly because cost savings for including fewer fibres than this would start to become minimal but also serves two purposes:

- it would allow for Cayman to act as a digital hub for the region, by supporting other jurisdictions in the Caribbean to reach the [redacted] NAP
- it provides a greater margin of error for the demand forecasts set out in this Strategic Case, with less reliance on future capacity improvements from upgrading transmittal equipment.

iv. Improved Latency

While latency is a meaningful consideration for a small subset of current and potential users on the Cayman Islands, it is not a major issue for most. With the existing latency on MAYA-1 in the region of 23ms (to [redacted] this is certainly adequate and within the acceptable range for the majority of international connectivity users. On the basis of multiple stakeholder discussions conducted during work on this OBC, it is assumed that the term 'improved latency' means to the USA, so any solutions with the shortest path to USA will naturally produce the lowest latency. Given the current routing and length of both MAYA and routes that go via CJFS, it is expected that any of the potential solutions would as a minimum be able to match or likely exceed the existing conditions, with most offering a improvement.

v. Delivery Confidence

The time from project approval to completion for a submarine cable can easily be in the region of 30-36 months. This, coupled with the uncertainty over the long-term future of the two existing systems, means that it is imperative that the Cayman Islands have a strategy in place which builds-in the highest possible level of confidence of success.

Given the international nature of submarine cables, it will not be possible to completely reduce reliance upon third parties, but steps can be taken to minimise this as far as practical. Self-build options naturally have the lowest level of reliance upon third parties, as CIG would be in control of the major part of the project. Solutions which are reliant upon branching units from already planned cables provide the lowest cost solutions, but come with complete dependence upon the third-party cable owner.

vi. Level of Control

Assessment of level of control CIG would have over how any delivered system would be operated. While in order to reach for example [redacted] it will to all practical purposes be impossible to be totally un-reliant on third-parties for some critical services to some extent. This being the case, it is normal, accepted business practice to mitigate any risks around control of capacity or access to onwards services by suitable contractual mechanisms. This criterion is essentially an assessment of risk of CIG not having full control over their portion of a new system and how it is operated.

I. Infrastructure options

178. This section considers the possible infrastructure solutions that could in principle deliver the project's objectives, and develops these conceptual approaches into a longlist of 19 options that have been considered in developing this OBC.

Conclusions from previous work — satellites

179. At SOC level, it was identified that only subsea cables or satellite connectivity could conceptually serve to provide international connectivity to islands such as the Cayman Islands. Two types of satellite options were identified: geostationary and low-earth orbit (LEO).

180. Geostationary systems operate 35,786km above the Earth's surface, and orbit in such a way that they appear in a fixed location to observers on the ground. LEO constellation systems, of which SpaceX's Starlink is the most well-known system, operate below 2,000km of the Earth's surface. Starlink is not currently available in the Cayman Islands, but claims to expect to commence service in Q3 2022[36]. LEO systems offer relatively low levels of latency but relatively low bandwidth, with each individual Starlink satellite providing around 20Gbps.

181. The SOC concluded that both kinds of satellite systems are currently inferior to submarine networks for transmitting high-capacity data traffic between countries, with geostationary systems experiencing high latency issues, and low-earth orbit systems lacking capacity. Subsea systems were considered to be superior with regard to a range of factors including capacity, transmission quality, confidentiality, capacity to upgrade, lifetime, and maintenance requirements.[37]

182. This position, which was established at SOC level, has been reconsidered in development of the OBC. It has been identified that, in addition to geostationary and LEO systems, medium-earth orbit (MEO) systems can potentially deliver connectivity. These systems operate above LEO systems, from 2,000km to 35,786km above the Earth's surface. The principal system of this type is O3b, a constellation owned by the Luxembourg-based SES which orbits at around 8,000km above the Earth, and which is designed to provide low-latency connectivity to remote locations.

183. A summary of the principal advantages and disadvantages of each type of solution is set out in Table 4 below.

[36] starlink.com/map
[37] SOC, page 18

Table 4: summary of satellite systems available in the Cayman Islands

System Type	Examples of systems available in the Cayman Islands	Pros	Cons
Geostationary	iDirect Broadband	Easy connectivity particularly to rural areas with fixed-point satellite.	Country-wide reliance on this system believed to be unprecedented. High levels of latency given the time taken for the signal to travel from the Earth to the satellite and back.
Medium Earth Orbit	O3b	Low latency	Unproven ability to scale at rates necessary for Cayman Islands
Low Earth Orbit	Starlink	Low latency Multiple satellites in view of Cayman Islands means 5-10x multiples of 20Gbps can be achieved. Pricing compares favourably to present Cayman Islands domestic broadband prices.	Unproven ability to scale at rates necessary for Cayman Islands Unproven long-term quality of service

184. Discussions with stakeholders and industry experts throughout the development of the OBC has further confirmed this view, and satellite options are not therefore considered in detail in this OBC. However, the technology may form part of a resilience solution for the Cayman Islands, including through ensuring the continued connectivity of Cayman Brac and Little Cayman, as described further in the Economic Case of this OBC.

Conclusions from previous work — subsea cables

185. At SOC level, five categories of approaches to subsea infrastructure were identified:

1. **A dedicated cable to and from the Cayman Islands**

   This option comprises a dedicated cable between the Cayman Islands and a network access point.

2. **Existing cable:**

   a) **A branching unit on an existing cable**

   b) **A fibre pair forming part of an existing cable**

   Options 2a and 2b comprise different approaches to connecting the Cayman Islands to an existing subsea cable that serves multiple territories and that is currently in operation. A branching unt provides transmission access on the main trunk cable. A fibre pair is a dedicated access to be used only by traffic to and from the Cayman Islands.

3. **Future cable:**

   i. **A branching unit on a future cable**

   ii. **A fibre pair forming part of a future cable.**

Options 3a and 3b are similar to Option 2a and 2b, but with the cable to which a connection is made being one that is not currently in operation.

186. At SOC level, these five categories of approaches were not developed further into specific infrastructure solutions.

Work at OBC stage

187. To develop this work at OBC stage, the project team has identified a range of specific infrastructure solutions that broadly fall into the five categories that were identified at SOC. These options were initially identified as an unfiltered 'long list', with all possibilities initially recorded. Further investigation demonstrated that some of the initial solutions identified are not viable.

188. Some of the potential solutions identified are based on confidential industry information secured by members of the project team, where publicly available information is limited.

189. The potential infrastructure solutions that have been identified at OBC fall into four broad categories, three of which map onto those used at SOC. The categories are described below.

    1. **Build a new dedicated link(s)**
    2. **Connect to an existing cable**
    3. **Connect to a future cable**

       Options 1 to 3 are conceptually the same as those used at SOC, which are described above.

    4. **Other**

       A fourth category of option, Category 4, has been added. This category is for options that do not neatly confirm to categories 1 to 3.

Overview of potential solutions

190. The potential solutions identified at OBC level are listed at a high level in

191.

192. Table 5, which also indicates which of the four categories described above each potential solution falls into. Each potential solution is then described in more detail and illustrated in the following tables. A separate summary table providing more information about each option is on page 90.

193. At this level, only a high-level approach has been taken to estimate the various attributes of the different potential solutions. This includes the length of each cable, and the likely scale of the capital and operational expenditure required to build and maintain each system respectively. Where options are subsequently taken forward to the Economic Case, more detailed costings are then developed. Specifically:

    - **Lengths** have been estimated on the basis of a desktop assessment
    - **Rough order of magnitude (ROM) capital cost** has been estimated in two ways. First, the length of each cable by an assumed build cost per kilometre. Secondly, Pioneer Consulting have used an industry-standard CAPEX model to estimate the costs of each solution. These two results have been averaged to create a 'Rough Order of Magnitude' (ROM) cost estimate, which has been expressed in KYD. **Operational** expenditure has similarly been estimated by Pioneer Consulting.
        - Note that for both the ROM CAPEX & OPEX figures, where available **the budgetary figures provided by the various solutions providers have been used**.

194. Each potential solution has also been assessed against the following criteria, building on the system requirements set out in Section G above:

    - **Resiliency**: the extent to which the potential solution would improve the cable resilience of internet connectivity to the Cayman Islands
    - **Pricing**: the extent to which the potential solution would improve ie decrease, the price of internet connectivity for consumers on the Cayman Islands

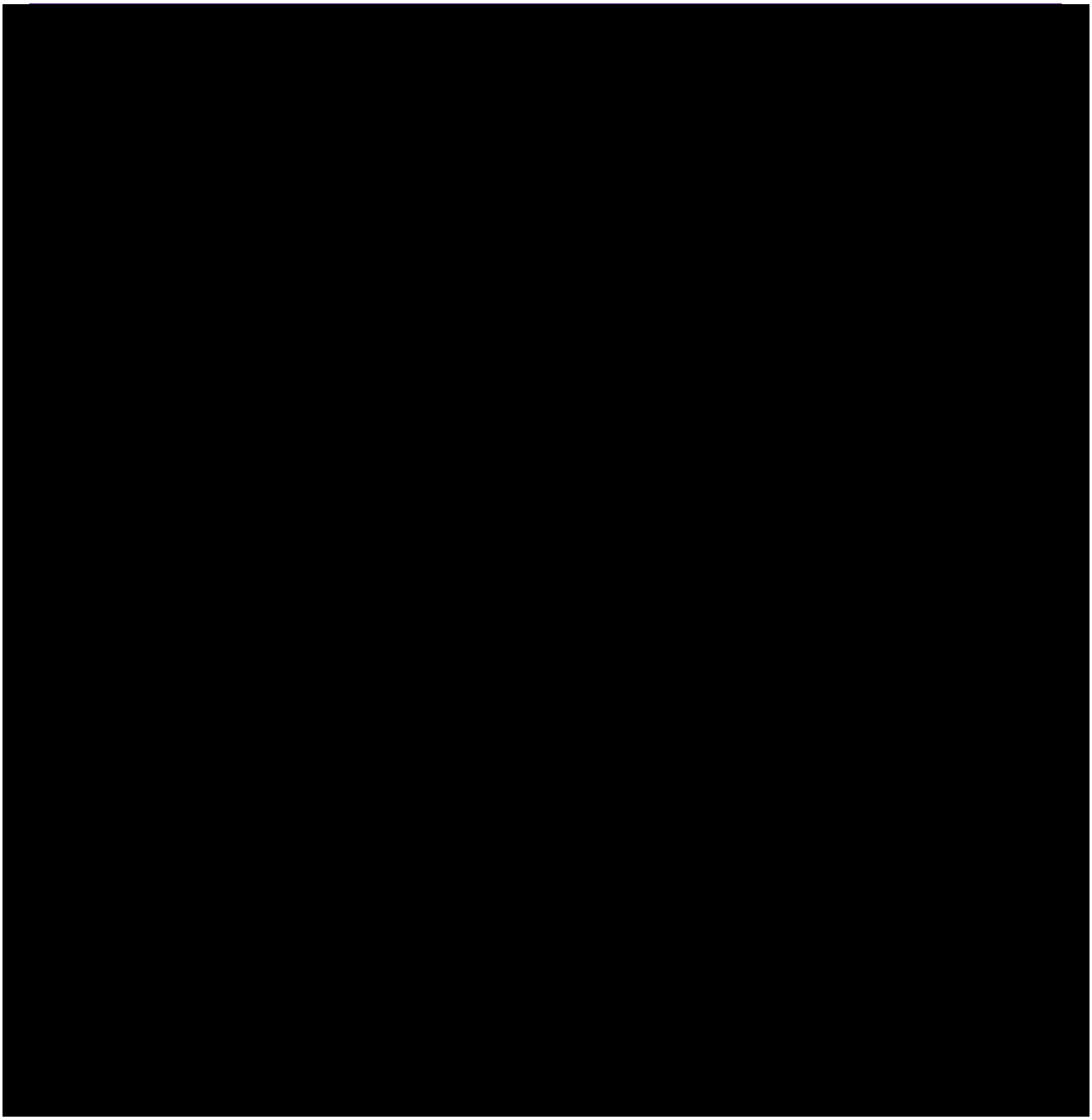
- **Capacity**: the extent to which the potential solution would be able to meet the forecast capacity requirements of the Cayman Islands
- **Latency**: The ability of the potential solution to provide improved latency (to the USA), compared with the existing offerings
- **Delivery Confidence**: the extent to which CIG team can have confidence in the successful delivery of the potential solution
- **Level of Control**: Assessment of level of control CIG would have over how any delivered system would be operated

195. In the tables on the following pages, each criterion has been given a score between 1 and 5, with 1 being a more positive conclusion than 5.

Table 5: longlist of infrastructure options considered at OBC

Category	Number	Name of Potential Solution	Page
1	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]

[redacted]



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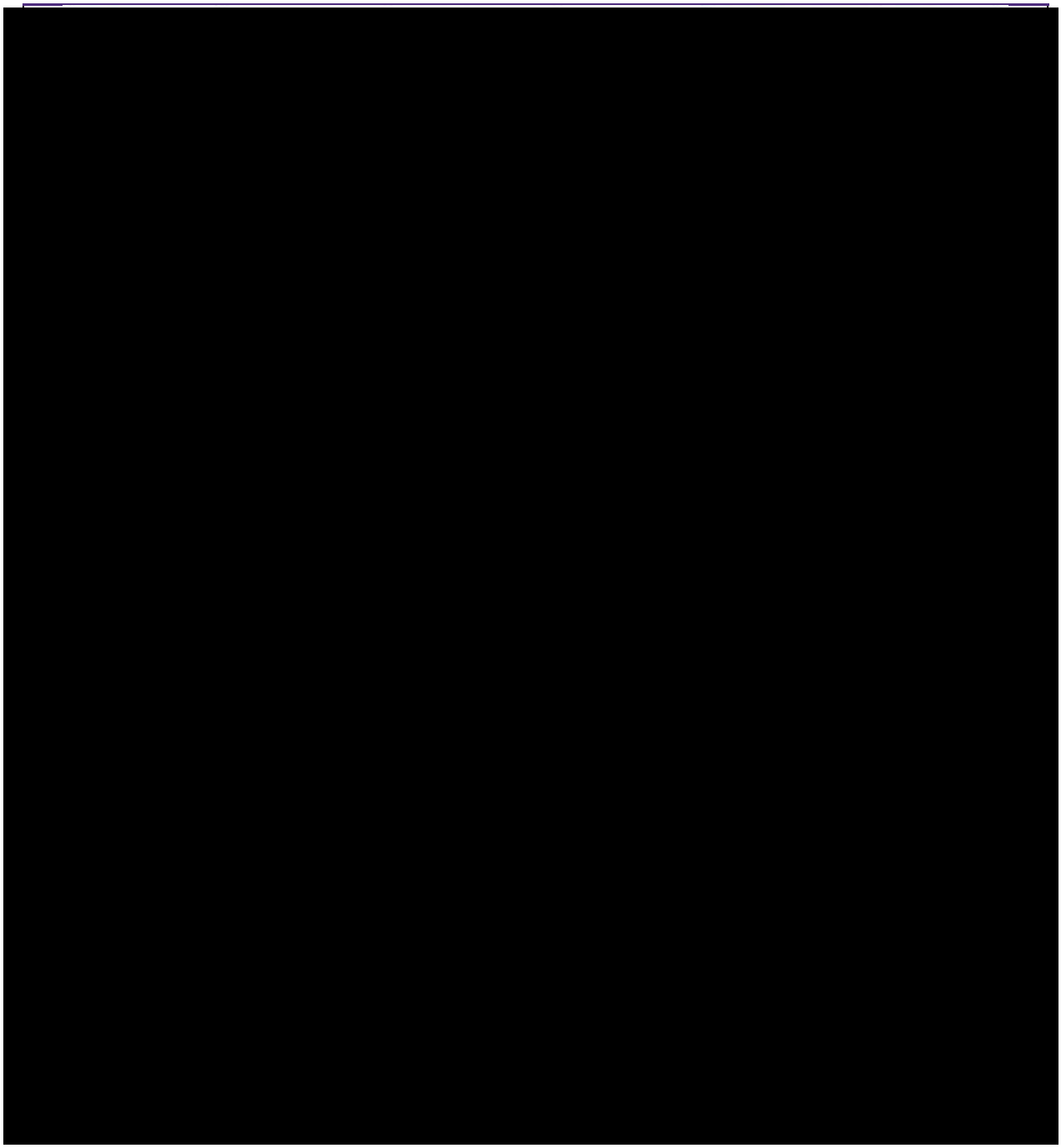

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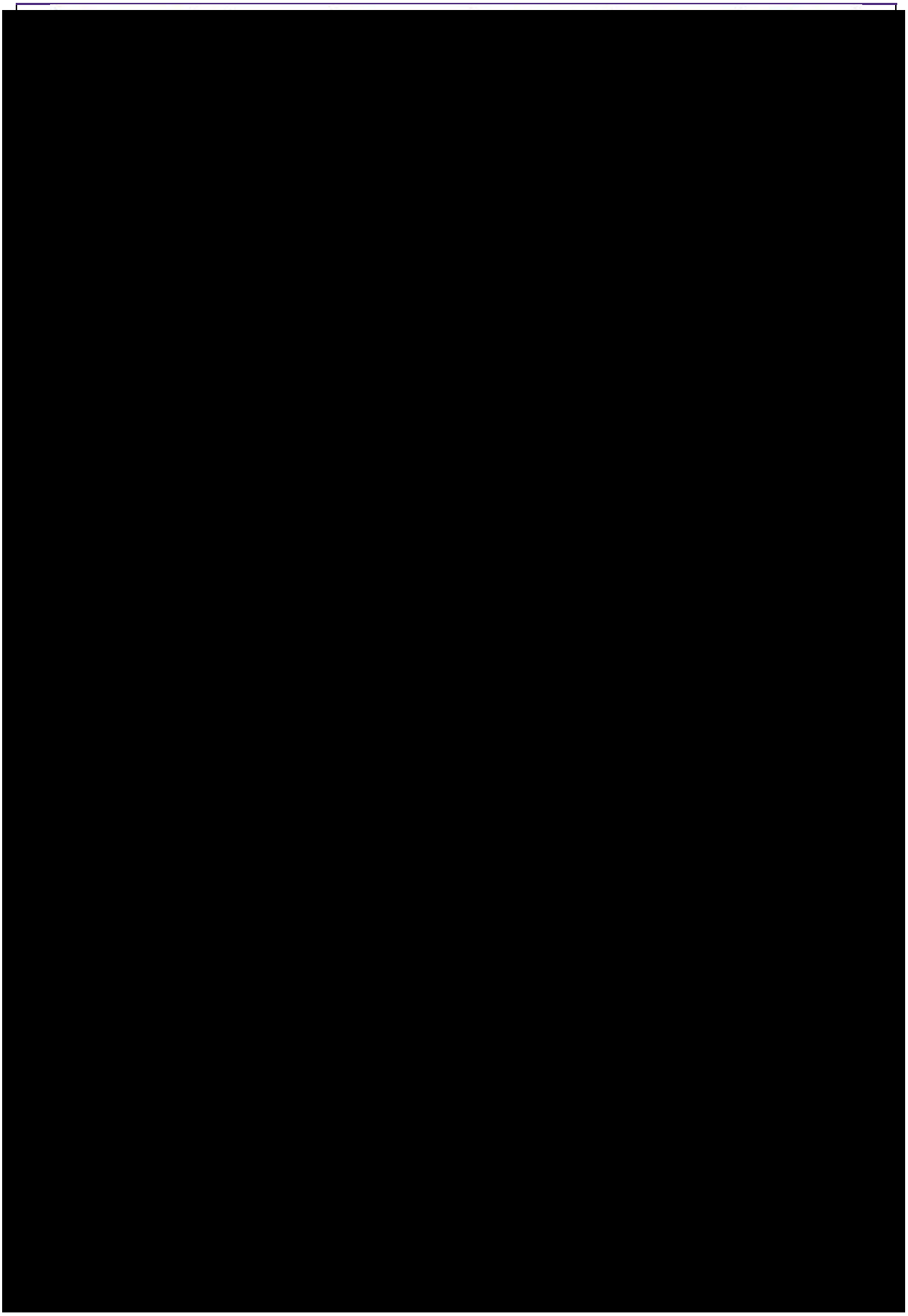

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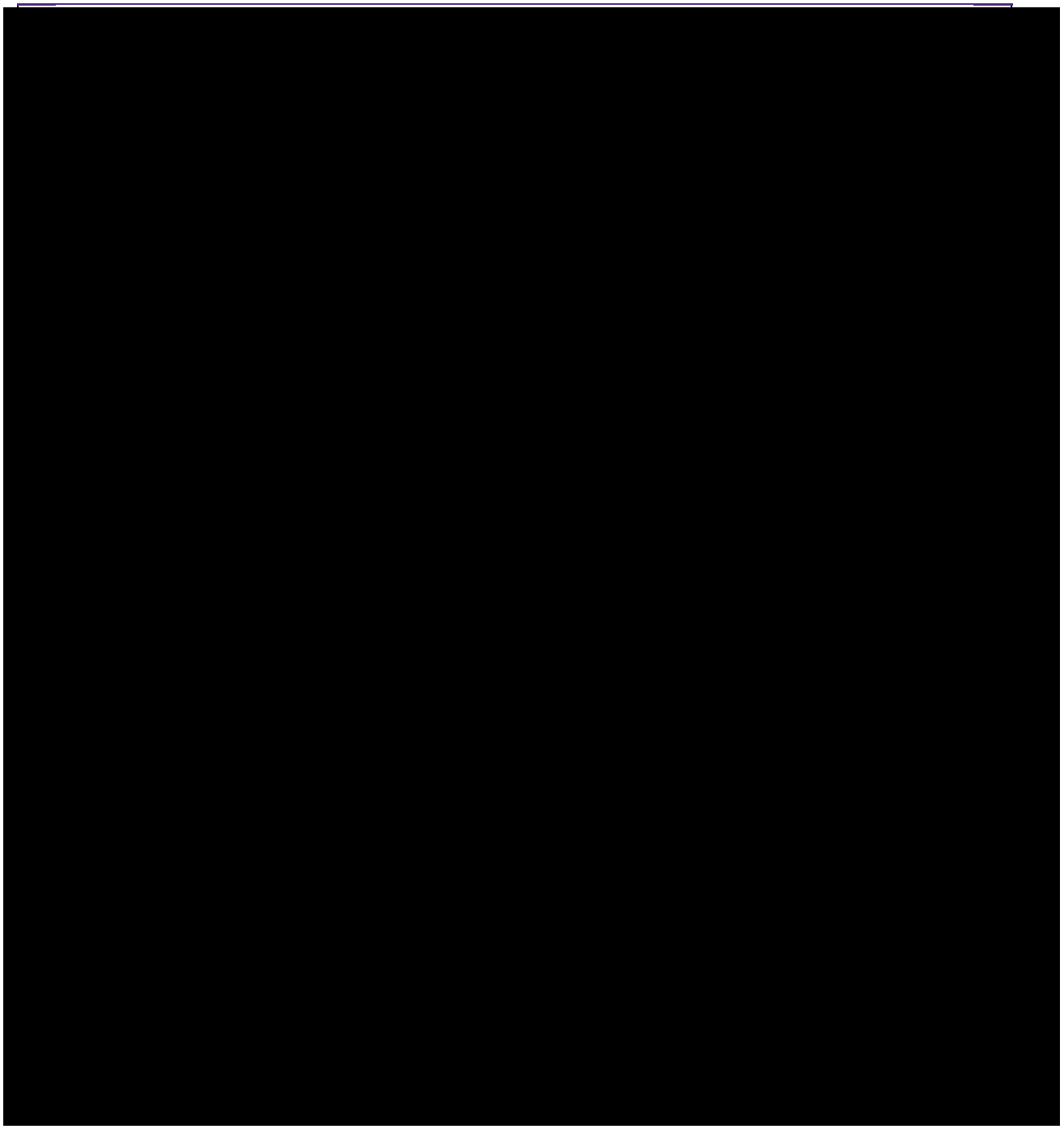

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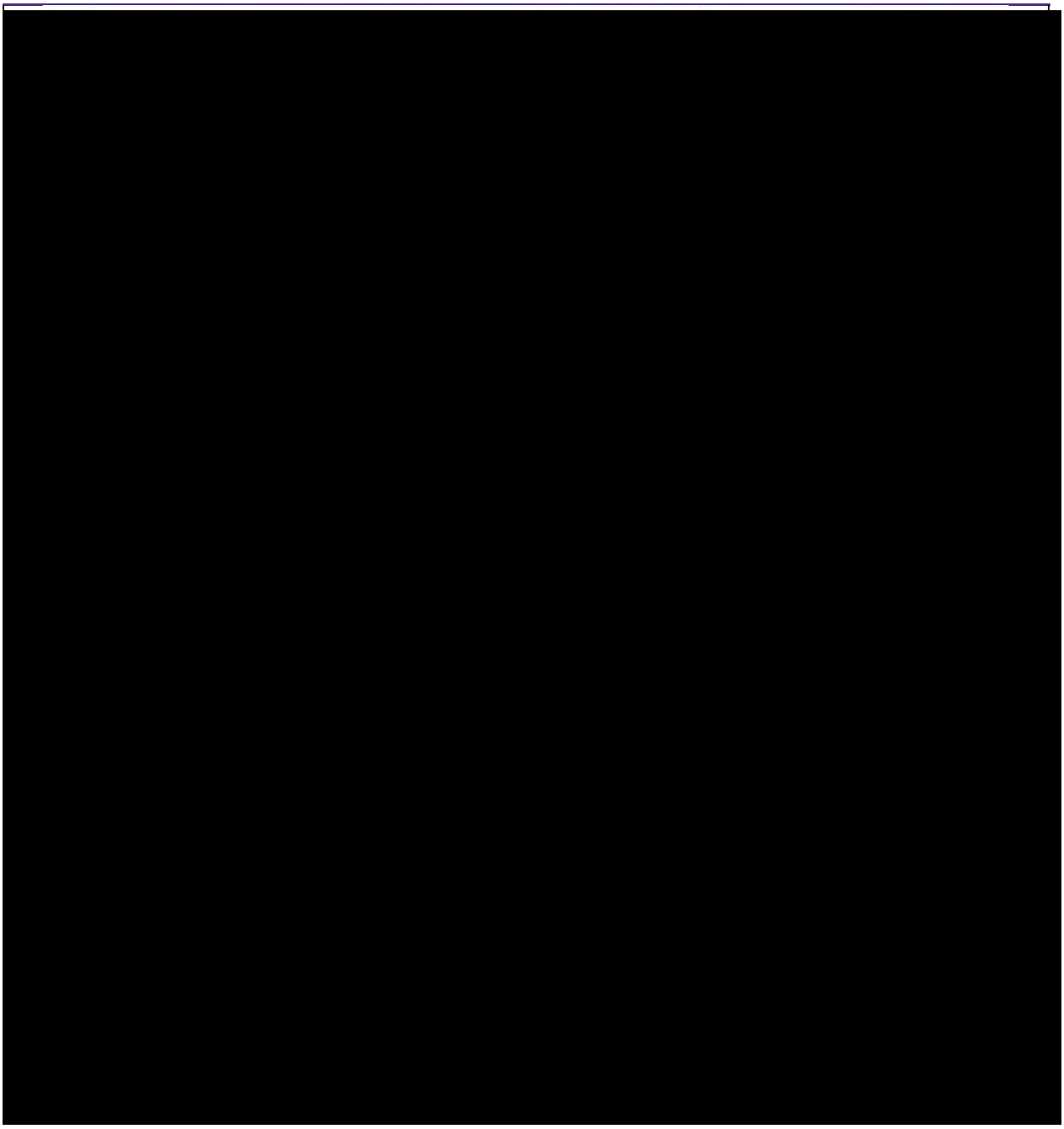

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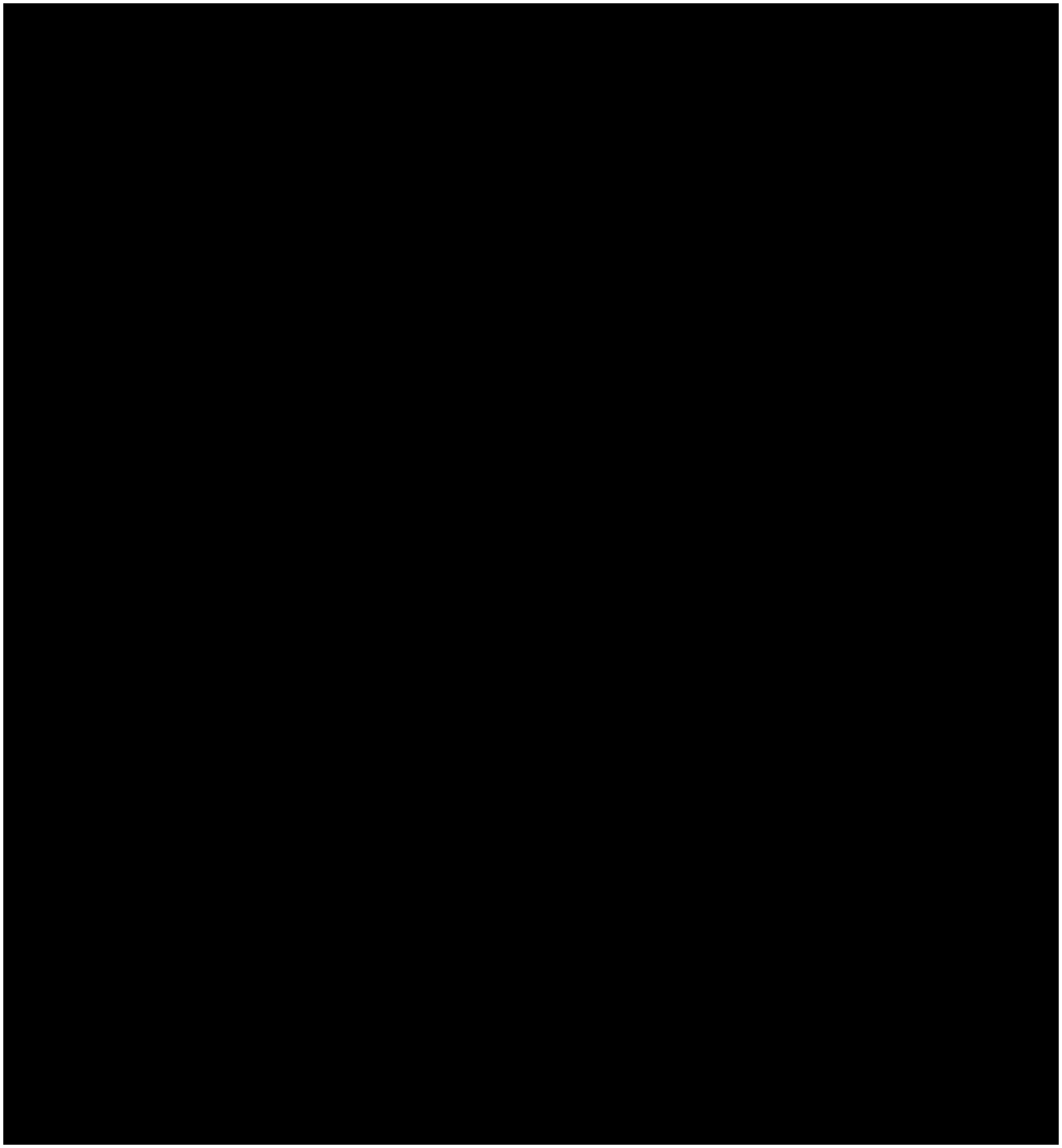

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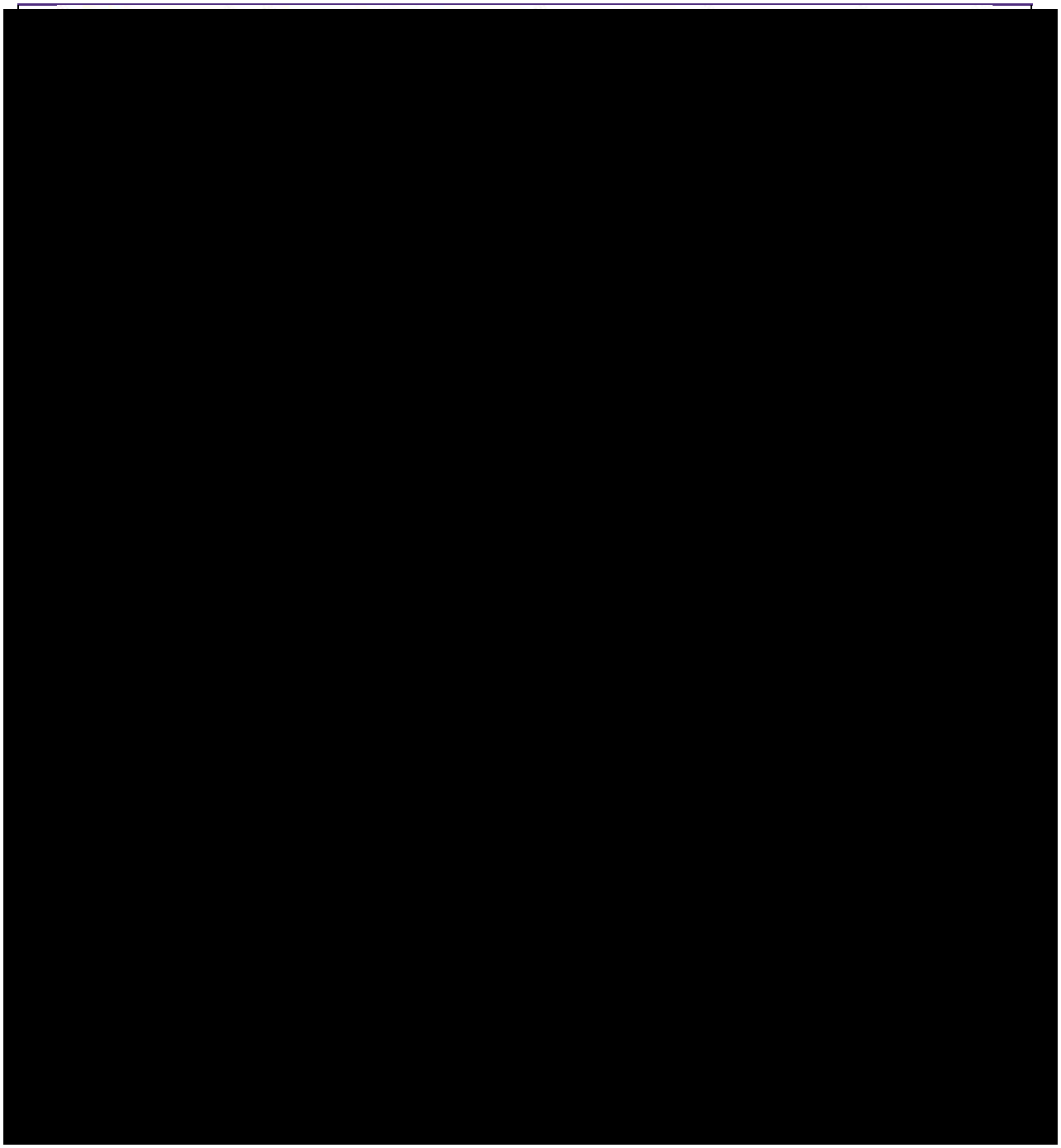

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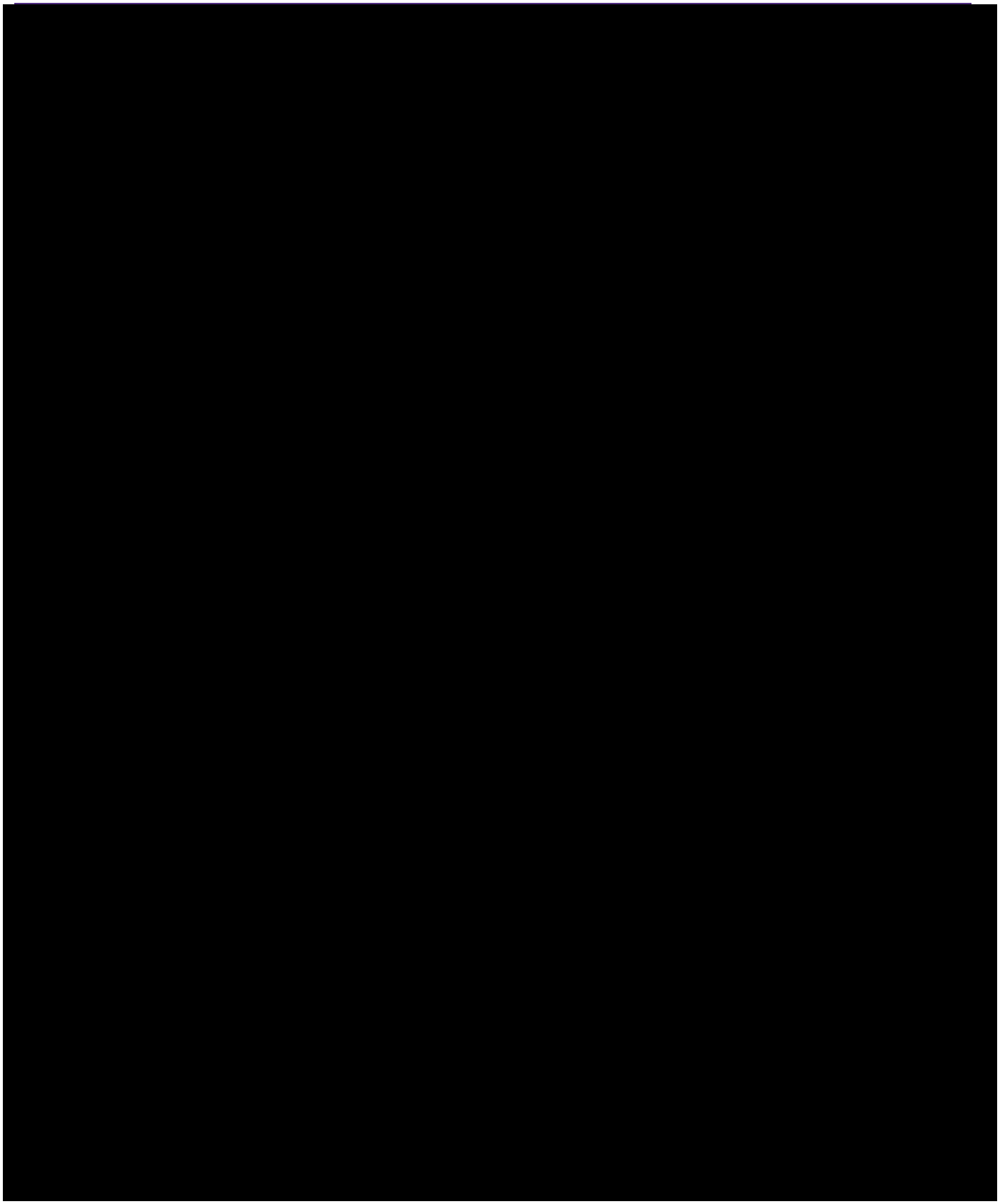

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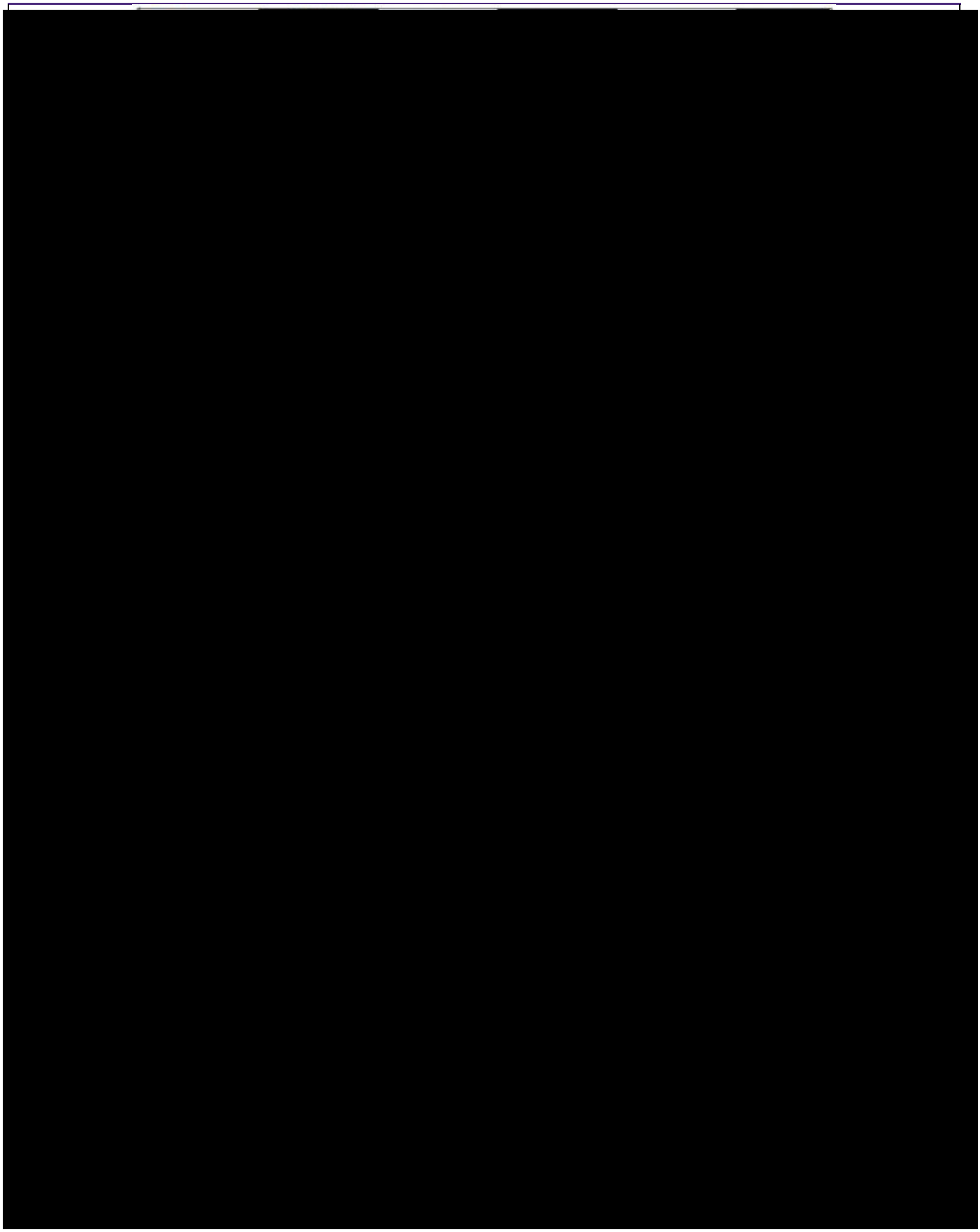

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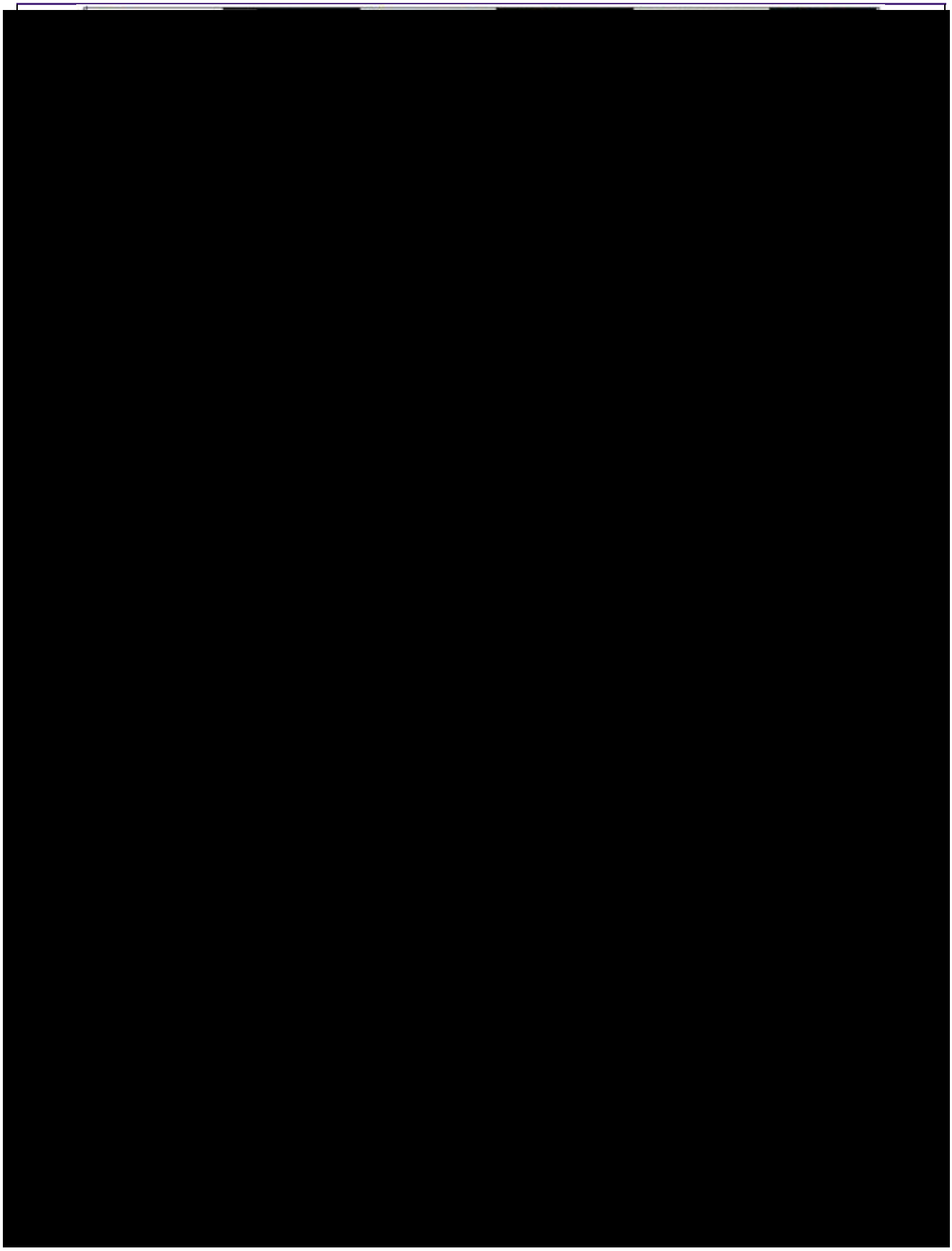

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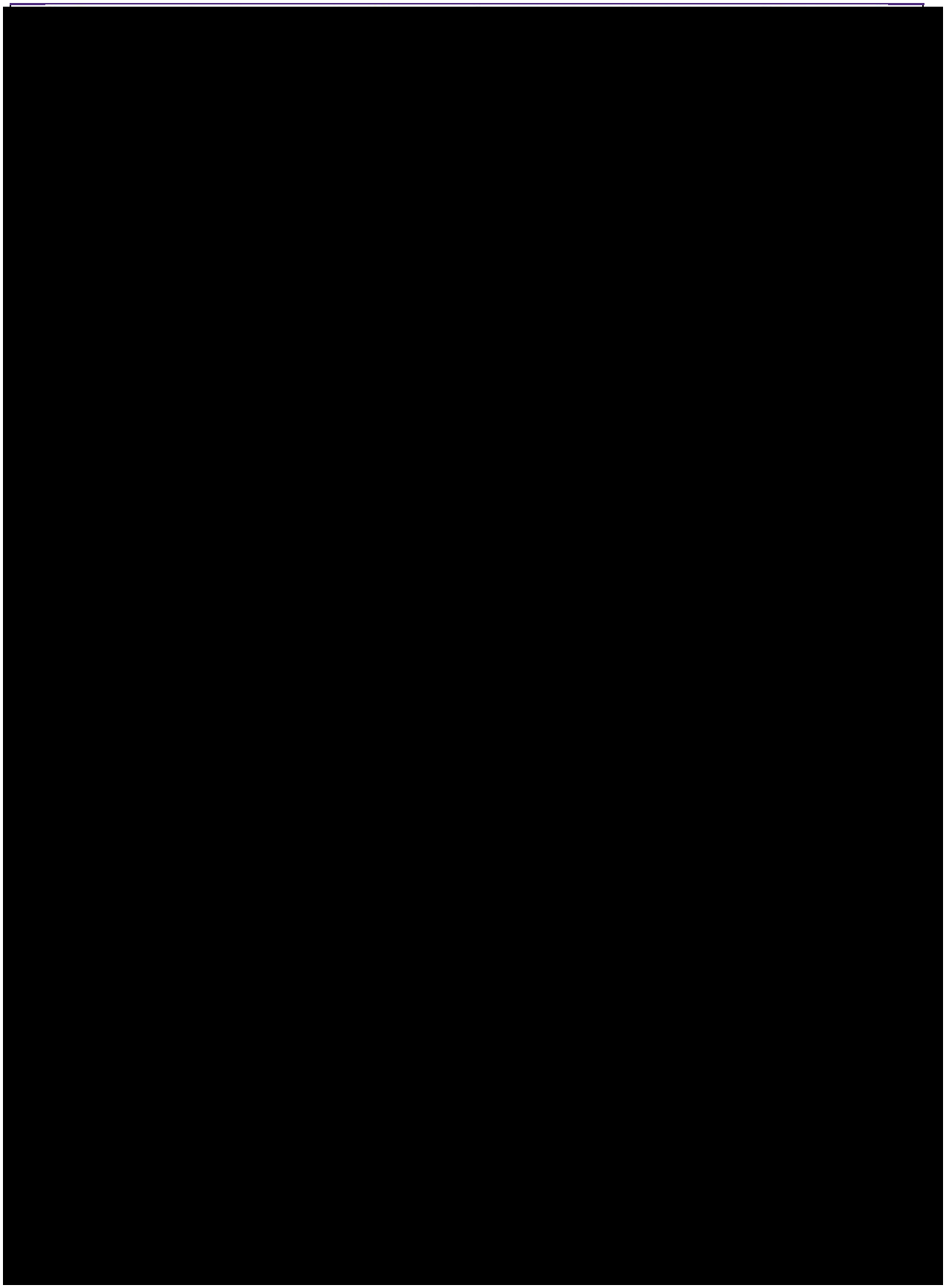

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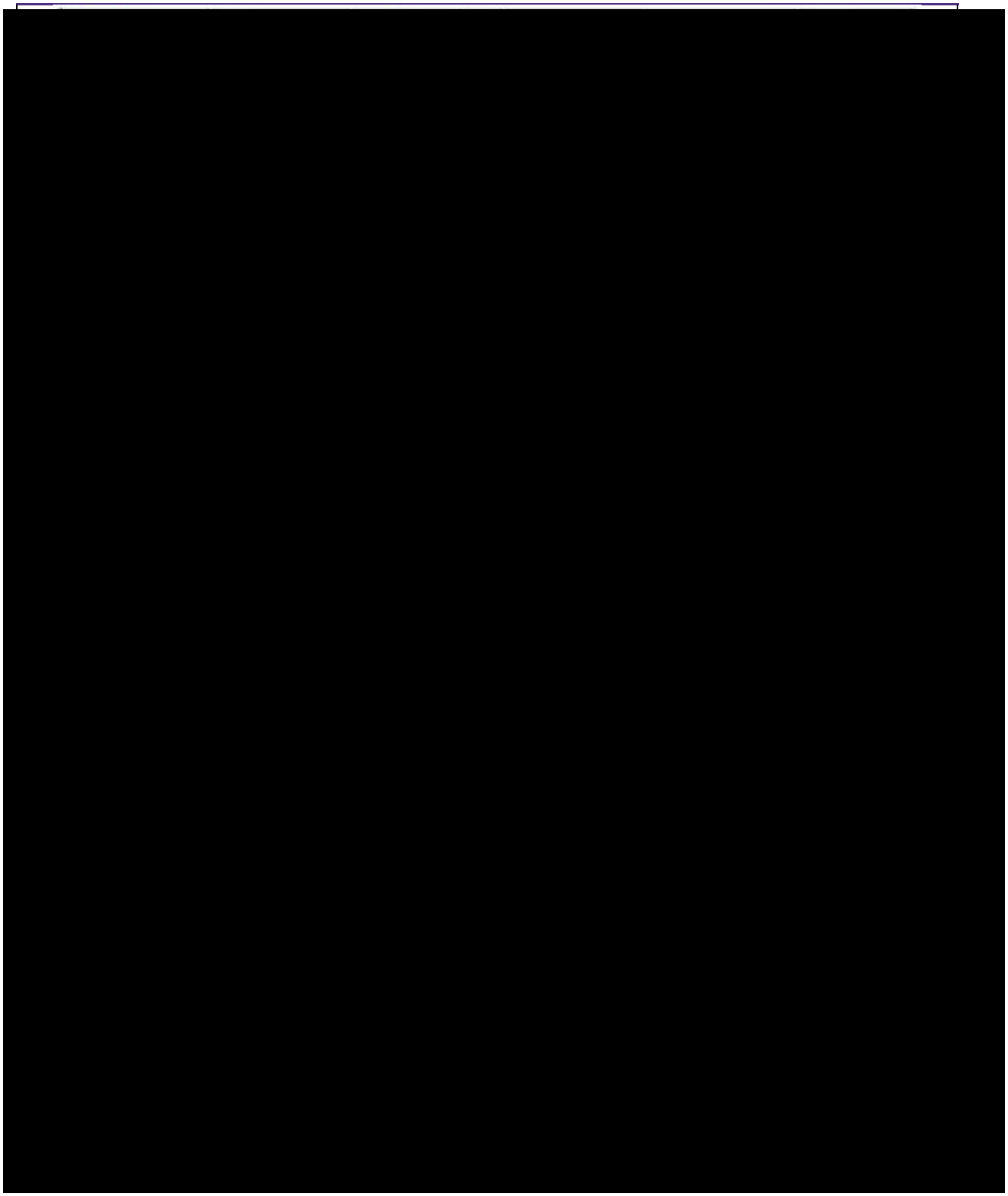

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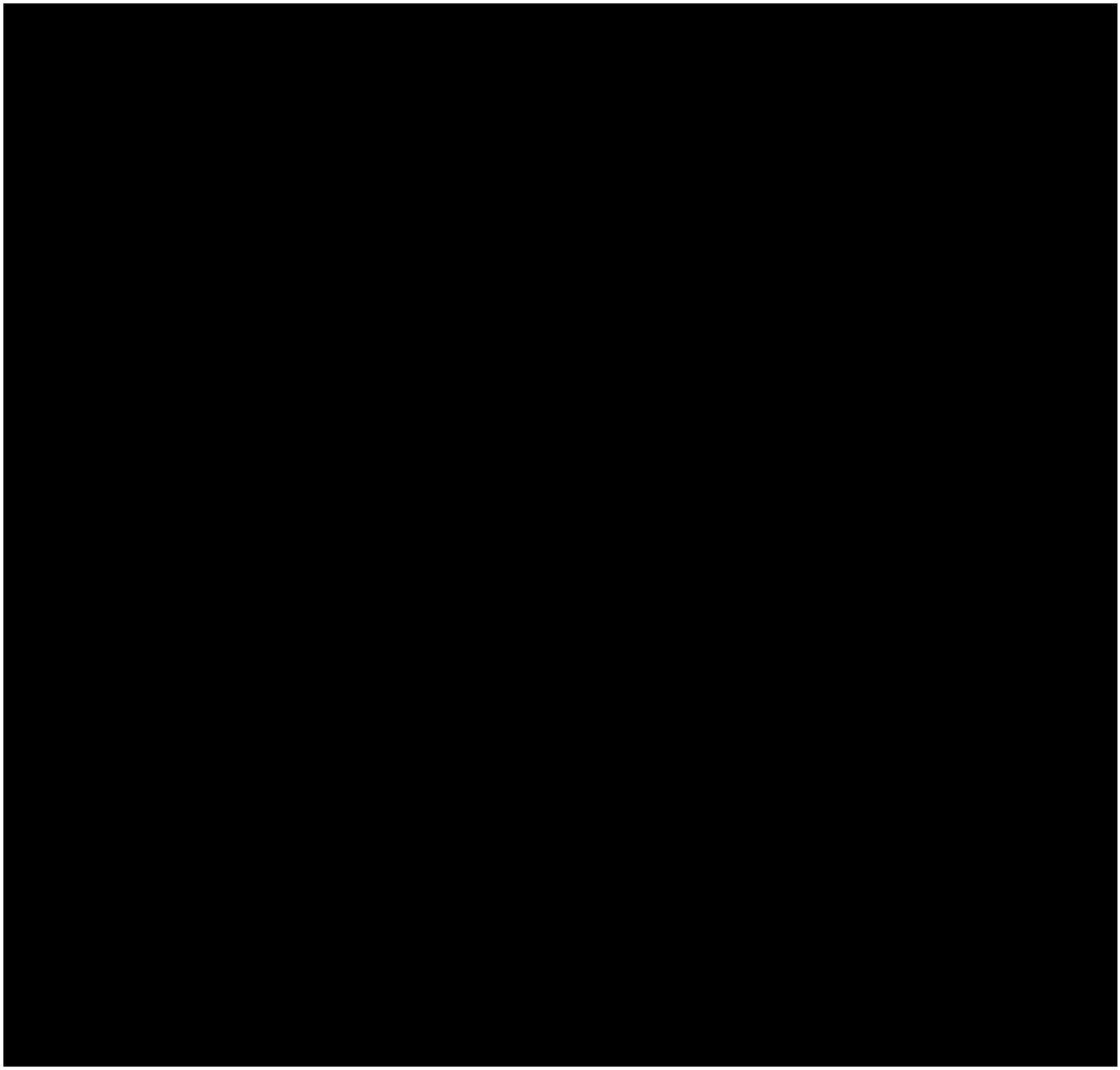

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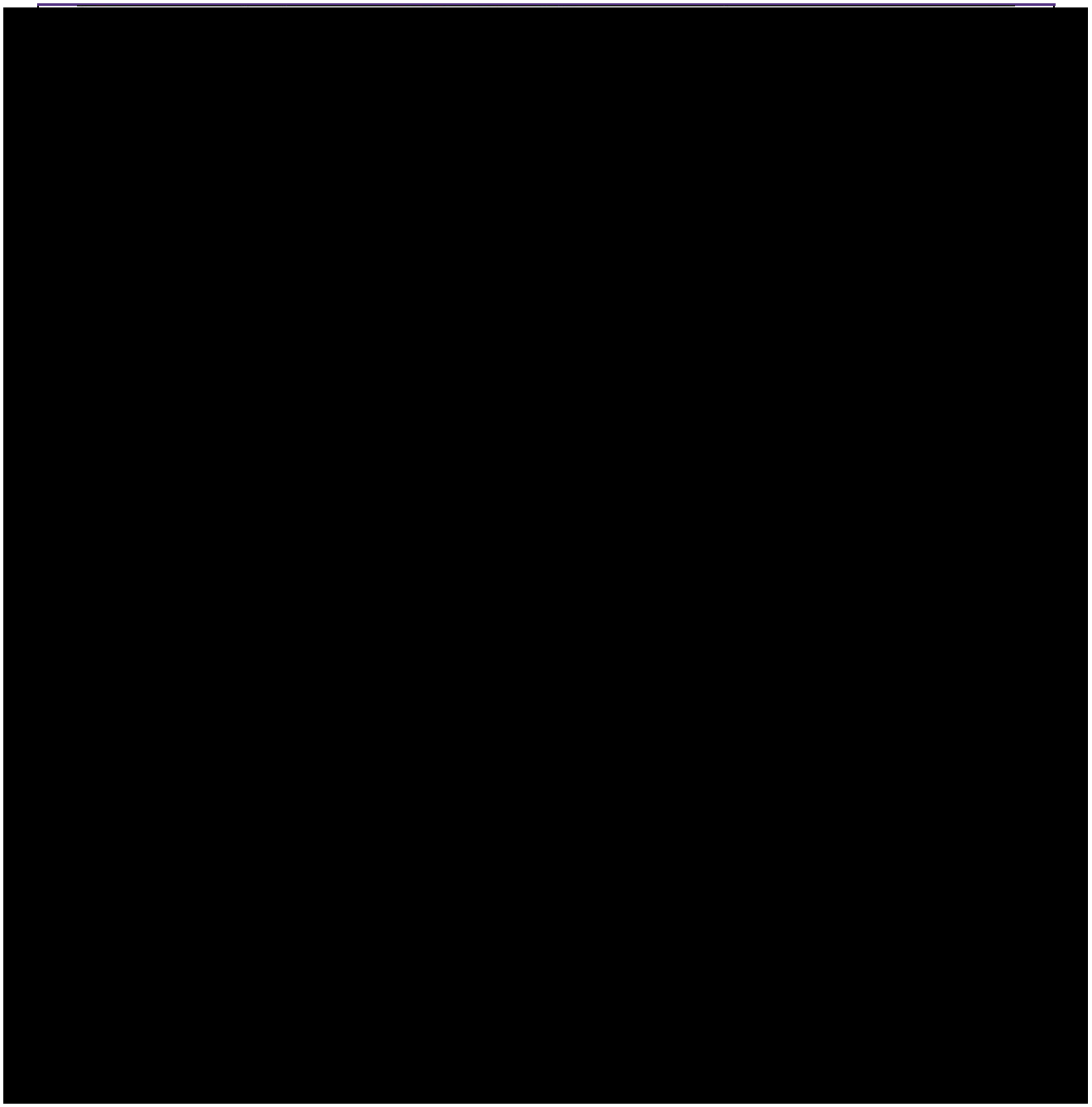


Table 6: summary of OBC infrastructure options

	Name of potential solution	Page	Approx length (km)	Rough order of magnitude capital cost (USD)	Annual operational costs (USD)	Reliability	Pricing	Capacity	Delivery confidence	Latency	Taken forward to Economic Case?
1a	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]					[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]					[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]			[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]			[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]			[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]			[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

	Name of potential solution	Page	Approx length (km)	Rough order of magnitude capital cost (USD)	Annual operational costs (USD)	Reliability	Pricing	Capacity	Delivery confidence	Latency	Taken forward to Economic Case?
8b	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]					[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]						[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]						[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Approach to selecting preferred options

196. Those options taken forward from this Strategic Case to the Economic Case of this OBC are assessed further in the Economic Case against the Critical Success Factors identified in this Strategic Case, which will select a small number of preferred options. The financial, commercial and management approach to those options are then considered in the relevant cases of this OBC.

J. Commercial models

197. As set out above, the detailed commercial approach to the preferred options identified in the Economic Case of this OBC will be explored in the Commercial Case of the OBC. This Section I briefly explains the high-level principles relevant to considering the commercial factors that relate to this project.

Previous work

198. At SOC level, the project identified three ownership and operation options for a new cable[38]. As set out in the SOC's Strategic Case, these were:

- **A government-owned Special Purpose Vehicle (SPV)**

  This approach would constitute a Limited Liability Company, funded and fully-owned by CIG, with a mandate to deliver the connectivity specified.

- **A Public Private Partnership (PPP)**

  This would constitute a joint venture of private investors and CIG working together. CIG could constitute either a majority of a minority shareholder in the PPP vehicle.

- **A consortium**

  This approach would entail an operator or operators jointly building a subsea cable to deliver connectivity to the Cayman Islands.

199. These [redacted] were evaluated at a high level in the Economic Case of the SOC[39], which concluded that the options of a **government-owned SPV** and a **majority-shareholder Public Private Partnership** should be investigated at OBC level.

Roles in delivery of new subsea connectivity

200. In order to develop the SOC's analysis further for the Strategic Case of the OBC, the project team has considered the different roles that would need to be delivered in order to deliver new subsea connectivity.

- **Ownership**

  The owner typically commissions a cable builder to construct a cable on a specified route. This entity is usually also responsible for financing the cable, and for ensuring its continued operation and maintenance.

- **Build**

  There are only limited firms that can physically install a new cable, given the significant complex infrastructure such as cabling ships required to do so.

  Whichever of the wide range of possible commercial approaches is taken to the commissioning and financing of a new cable, it is likely that the actual deployment of the cable will be undertaken by a specialist firm that owns the appropriate ships and other infrastructure necessary to install a cable.

- **Operation**

  An entity is required to deliver the continued operation of a cable.

- **Delivery of marine repair and maintenance**

  The principal approach to the repair and maintenance of subsea cables is through a dedicated maintenance provider. There are different approaches, but all require access to cabling ships so that the cables on the seabed can be accessed.

  Often, cable owners enter collaborative agreements with other cable owners to reduce the costs of maintaining ships. The principal agreement in place in the Caribbean is the Atlantic

[38] SOC, page 19
[39] SOC, page 28

Cable Maintenance Agreement (ACMA)[40], a non-profit cooperative agreement which is run by its members.

The costs of maintenance and repair agreements can vary significantly, depending on factors such as the speed of ship mobilisation that is guaranteed, the speed at which a ship can reach a repair or maintenance site, and the time taken to effect repair or maintenance.

- **Landing Party**

  A landing party is required in each jurisdiction that a subsea cable lands. It is responsible for ensuring that appropriate permits and licences are obtained, renewed and complied with, and (typically) for ensuring that the Cable Landing Station (CLS) is maintained and operated effectively.

  A distinction can be drawn between 'operations and maintenance' landing parties, which manage a cable but does not control access and pricing, and a 'commercial entity' landing party, which controls access to and pricing of the cable's capacity.

- **Commercialisation**

  The capacity that a cable provides is typically sold to downstream providers. Typically, this capacity is sold in 'blocks' of e.g.10Gbps, on a per-month basis (but committed to for longer, fixed periods), of which the purchaser can use as much or as little as they wish. The term Monthly Recurring Charge (MRC) is used to describe these prices. The period over which these contracts can be in place vary from months to years, and depend on the details of the commercial agreement between parties.

201. Given that there are relatively industry-standard approaches to the **building** and the **repair and maintenance** of subsea cables, the principal questions that will need to be resolved in developing the Commercial and Financial Cases of this OBC are those regarding the **ownership** and **landing party (including commercialisation)** of any new cable, plus the approach to financing the capital investment. This is considered further in the Commercial Case.

[40] https://www.acma2017.com/

K. Dependencies and constraints

202. It is only through careful mapping and analysis of dependencies that it can be assured that delivery of a project will deliver its desired outcomes. In other words, the factors outside the scope of the project but upon which the ultimate success of the project depends need to be considered.

203. It is clear from the work recorded in this Strategic Case that new subsea connectivity for the Cayman Islands seems **necessary** in order that the Cayman Islands Government can deliver the project objectives as set out in Figure 3 on page 44. However, it does not appear that new subsea connectivity alone is **sufficient** to guarantee their achievement; indeed, a number of dependencies have been identified.

204. The project **dependencies** that have been identified in assembling this OBC are:

- **On-island infrastructure**

  The objective that includes the ambition to 'support digital inclusion and social/economic participation' can only be delivered if all citizens of the Cayman Islands are able to benefit from the islands' improved connectivity that would arise from a subsea cable.

  This relies on the delivery of on-island infrastructure across the Cayman Islands to connect residential and business premises across the islands to the new cable, including to less-populated areas such as Cayman Brac and Little Cayman. Assessment and delivery of this infrastructure is beyond the scope of this project, other than contemplating whether an intervention in the market for international connectivity could be a catalyst for improved efficiency or innovation.

- [redacted]

  [redacted]

- **Other wholesale costs of digital connectivity**

  The objective that includes the ambition to 'ensure affordability' cannot be certain to be delivered through a subsea cable alone, as there are other factors beyond the costs of international connectivity that determine the cost of digital connectivity on the Cayman Islands. While the component of domestic pricing that relates to international connectivity will be influenced by this project, other elements of consumer pricing are beyond the scope of this project. These elements include the costs of on-island distribution, including the paying down of capital investment, operations and maintenance, and other costs of doing business.

- **(For self-build options) Ability to secure onward connectivity**

  In order that a new submarine cable could be used, connectivity between its remote cable landing station and a network access point such as [redacted] is required. This is typically provided by the owner of the cable landing station as part of their commercial agreement with the cable owner. A failure to secure this onward connectivity at an appropriate price may mean that a new subsea cable would be unable to deliver its objectives.

Constraints

205. In business case terminology, constraints are the external conditions and agreed parameters within which a project must be delivered, and over which the project has little or no control. In addition to those dependencies identified above, a number of constraints to the project have been identified by the project team.

206. The constraints identified are set out in the table below.

- **Availability of government funding and/or financing**

  As described in detail in the Financial Case of this OBC, government financing and potentially government funding it is likely to be required to deliver a new cable. At this stage, the level of

funding and/or financing that CIG is willing to commit to this project has not been determined, but will be informed by this OBC. Any such decision would represent a constraint on the project.

- **Regulatory environment**

  In the Cayman Islands, the telecoms sector is subject to regulation by the multi-sector regulatory authority, the Utility Regulation and Competition Office — known as OfReg. OfReg is responsible for licencing operators of ICT networks.

  Decisions of the regulator with regard to any applications by the CIG to act as a participant in the market for international connectivity will represent constraints on the project.

- **Topology**

  The geographical nature of the Cayman Islands and its territorial waters present constraints with regard to the physical nature of any new subsea cable. For example, different areas of the coastline are protected in various ways and would therefore not represent suitable landing sites for a new subsea cable. These constraints are explored in detail in the Management Case of this OBC.

L. Risks

207. At SOC level, five principal risks to the project were identified in the Strategic Case. These were:

- **Private sector investment shortfall**

  It was considered that a lack of private sector investment in a project to deliver a new cable could be mitigated by the government investing in the project.

- **Project cost overrun**

  A risk was identified that the project goes over budget.

- **Political**

  A risk was identified that a change in administration might affect the level of support for the project.

- **Local data availability**

  A risk was identified that it may be difficult to obtain required market data from ICT operators.

- **Procurement**

  A risk was identified that possible selection of unsuitable partners to deliver the project could lead to delays.

208. At OBC level, the project team's understanding of risks to the project has been refreshed, and distributed between appropriate cases of this OBC. **Financial risks** are therefore considered in the Financial Case of this OBC, **commercial risks** are considered in the Commercial Case, and **management and delivery risks** are considered in the Management Case. The revised risk analysis is presented in Table 7: list of risk categories below.

209. In line with the Better Business Cases guidance, three types of risks are considered in the table:

Table 7: list of risk categories

Risk Categories	Desription
Government risks	These risks remain with the CIG, and cannot be transferred to third parties.
Service risks	These risks fall within the delivery of the project and may be shared with other parties outside CIG.
External risks	These risks affect all society and are not connected directly with the proposal. They are inherently unpredictable and random in nature.

210. As the project moves forward to Full Business Case stage, it is recommended that regular risk analysis and reporting be undertaken by the project team as part of its regular rhythm of governance, as described further in the Management Case.

Table 8: strategic risks

	Strategic Risk	Type of risk	Possible event	Possible impact of event	Mitigation approach
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2	Regulatory obstacles	Government	A failure to secure the necessary licence or otherwise act in accordance with ICT or competition regulations…	…could delay delivery of the project and frustrate the anticipated economic benefits.	Ongoing regular engagement with the regulator OfReg to test emerging views
3	Loss of political will	Government	A loss of political will for the project…	…could result in the project being cancelled or sufficient funding not being made available (or being withdrawn or reprioritised).	Work to identify, quantify and track specific measurable benefits arising from the project (as described in the Benefits Management section of the Management Case of this OBC) to provide a robust evidence base to demonstrate the value of the project.
4	Unanticipated market response to project	Government	Various market responses to the project, including: alternative new private sector cables being developed in parallel; and aggressive pricing and competitive responses by operator of existing cables.	…could result in the cable not being used to the extent anticipated, threatening its financial sustainability and potentially reducing the economic benefits.	Development of a resilient business plan plus clear and early market signalling of any CIG commitment to develop a cable.

	Strategic Risk	Type of risk	Possible event	Possible impact of event	Mitigation approach
5	Ineffective procurement	Government	Failure of CIG to procure effectively	…could result in sub-optimal supplier pricing or disadvantageous contractual arrangements which undermine financial sustainability and potentially reduce the economic benefits.	Secure skilled procurement professionals to apply best practice in procurement approach.
6	Demand forecasts	Government	Modelling assumptions adopted for this OBC not being borne out by reality	Could mean that demand experienced on a new cable is different from that expected, potentially reducing revenues.	Take a cautious approach to pricing assumptions and conduct sensitivity analysis around forecast demand levels. Monitor emerging evidence as the project moves forward and reassess forecasts in light of any new evidence identified.
7	Cost	Service	The costs of infrastructure options may be higher than has been estimated in work to develop this OBC	Options that were initially believed to be affordable and financially viable are unaffordable or financially unviable.	Before procurement, active engagement with and monitoring of the supply chain to assess ongoing market conditions. Ensure robust contractual transfer of cost risk to system suppliers as part of procurement, where this represents value of money. Ongoing monitoring and tracking of cost risks after contract signed, seeking to minimise any additional costs and/or revisit the business plan.
8	Time	Service	The time taken to deliver infrastructure options or associated permits may be longer than is estimated in work to develop this OBC	the solution in question cannot be delivered as quickly as estimated, reducing revenues and delaying delivery of economic benefits.	Ensure robust conditions relating to timescales on delivery contract.

	Strategic Risk	Type of risk	Possible event	Possible impact of event	Mitigation approach
9	Higher than expected frequency of faults	Service	Faults arising on a new cable may occur more frequently than anticipated	Reduced economic benefits and revenues, and increased repair costs compared to what has been estimated.	Ensure appropriate contingencies are in place, along with contractual remedies where appropriate.
10	Failure of contracted delivery	Service	A contracted delivery partner may fail to deliver, for example through insolvency	Government funds spent with that firm could be put at risk, and the anticipated economic benefits and revenues are not secured.	Ongoing monitoring of selected suppliers, including where possible their liquidity and financial position. Ensure appropriate milestone payments in place to minimise risk of costs being incurred for work not conducted.
11	Catastrophic events	External	Unexpected catastrophic events (such as unprecedented meteorological or public health events) could frustrate delivery of the programme	The project fails to deliver the economic benefits anticipated.	Ongoing engagement with wider CIG contingency planning.
12	General inflation	External	A general sustained rise in the price base may occur	Reduced affordability of infrastructure options compared to what has been estimated in this OBC.	Materials can be purchased and stored in advance Commit to futures contracts to provide certainty of material costs. Potentially revisit the business plan as appropriate.
13	Future technological developments	External	Future technological developments may reduce or eliminate the need for subsea connectivity in the future	Reduced or eliminated revenue and economic benefits attributable to a new cable.	Although there may be no obvious way to mitigate this, the risk appears to be limited over the lifecycle of the cable. Note that CIG objectives may be met by alternative means in this scenario.

M. Conclusion

211. The Strategic Case shows that there is a strong strategic case for the Cayman Islands Government to intervene in the market, and that there is a high degree of clarity with regard to the requirements of a new cable, both from a technical perspective and with regard to the Critical Success Factors for the project.

212. The Strategic Case demonstrates that there is a range of infrastructure options that have the potential to satisfy the project's requirements. The options considered to have the greatest degree of potential are explored further in the Economic Case of this OBC.

213. There are various dimensions of uncertainty with regard to what would happen if the project did not go ahead. This includes the uncertain duration that the existing infrastructure would continue to operate, and whether and when a new third party operator may construct a new cable. These uncertainties are explored further in the Economic Case.

214. The Strategic Case also identifies a range of risks that the project faces. These notably include affordability and the risk of challenge of the Government's participation in the market. These and other risks will need to be monitored and carefully managed as the project moves into delivery, as described in the Management Case. The impact of these risks is also discussed, where relevant, in each of the other four cases of this OBC, which comprise:

    - the Economic Case, which considers the extent to which the infrastructure options brought forward from the Strategic Case meet the Critical Success Factors, and assesses the economic effects of the project
    - the Commercial Case, which identifies and assesses the different commercial options that could be used to develop the project
    - the Financial Case, which considers the financial viability of the project
    - the Management Case, which considers the approach to delivering the project, including a Permitting Feasibility Study.

Economic Case

Economic Case: table of contents

A. Introduction

1. This Economic Case is structured as follows:

    - Following this introduction, **Section B** introduces the Economic Case, describes how it fits into the broader context of this Outline Business Case, and explains its links to the other four cases.

2. The remainder of the Economic Case can be considered in two halves.

    - The first half, comprising **Section C,** considers the range of infrastructure options developed in the Strategic Case in light of the project's Critical Success Factors (which are also explained in the Strategic Case), to determine their suitability to deliver the CIG's objectives. Whereas the Strategic Case assessed the technical suitability and feasibility of each longlisted option identified (covering issues such as capacity and latency), the Economic Case considers attributes of each possible solution – that meets the technical requirements and feasibility – that will affect the economic value to the Cayman Islands.

3. The second half, comprising **Sections D** and **E**, then considers the potential economic effects on the Cayman Islands of improved digital connectivity, and, where possible, seeks to monetise these effects to help to inform CIG's decision-making about how to proceed with the project. In this section.

    - **Section D** identifies the economic impacts and benefits to the Cayman Islands that may arise from improved connectivity, and sets out the economic appraisal of these potential impacts and benefits that have been assessed at this OBC stage.

    - **Section E** assembles the monetised economic benefits against the net costs to government for each key scheme to summarise the monetised value for money case and presents scenario-testing for key risks and uncertainties.

    - **Section F** then concludes the Economic Case.

B. Role of the Economic Case

4. This section describes the work undertaken on the Economic Case at the Strategic Outline Case (SOC) stage, and describes the work that has been conducted to move the project forward to this OBC stage.

Role of the Economic Case

5. The role of the Economic Case is to identify the proposals for subsea connectivity that deliver the best public value for Cayman Islands (including consideration of wider social and economic effects as well as financial issues) and to demonstrate whether the benefits will outweigh the costs of delivery. These preferred proposals are then analysed in more detail in the Financial Case (which describes the work undertaken to model the financial impacts of the options) and the Commercial Case (which analyses the possible commercial approaches to delivery of each option). The Management Case then considers the deliverability of the options and the approach to doing so.

Economic Case at SOC

6. At the SOC stage, the Economic Case conducted analysis of possible conceptual infrastructure and ownership and operations approaches to a new cable. The analysis concluded that the preferred options for infrastructure were a dedicated new subsea cable system, and a fibre pair on a new third-party system. The analysis also concluded that the preferred ownership and operations options were government-only (through a Special Purpose Vehicle), and a public-private partnership (effectively a joint venture) in which CIG would be a majority shareholder.

Work undertaken at OBC

7. To progress work on the Economic Case to OBC stage, the options shortlisted in the Strategic Case have been appraised against the Critical Success Factor framework that was developed in the Strategic Case in light of the project objectives.

8. The economic benefits of improved connectivity have been identified, and the value of resilience that would be introduced by a new submarine cable has been calculated.

C. Performance of infrastructure options against Critical Success Factors

9. This section considers the performance of the infrastructure options brought forward from the Strategic Case against the five Critical Success Factors (CSFs) defined in the Strategic Case.

Infrastructure options brought forward from the Strategic Case

10. The Strategic Case of this OBC considers a long list of eighteen options to deliver new digital connectivity to the Cayman Islands. Consideration of viability in the Strategic Case produced a shortlist of eight options for further consideration. These can be divided into three conceptual groups:

    - **Self-build options**

      Self-build to [redacted] (this option can be built with or without a branching unit to Cayman Brac)

      Self-build to [redacted] (this option can be built with or without a branching unit to Cayman Brac)

    - **'Spur' options**

      [redacted]

    - **Cayman resilience options**

      A new standalone link between Grand Cayman and Cayman Brac.

11. Details of each of these options is set out in Section I of the Strategic Case of this OBC. The remainder of this Section C considers these options against the CSFs defined in the Strategic Case.

Critical Success Factors brought forward from the Strategic Case

12. Table 1 below summarises the Critical Success Factors (CSFs) that were identified in the Strategic Case of this OBC.

Table 1: Critical Success Factors identified in the Strategic Case

Critical Success Factor	Commentary	Justification
1. Continuity	CIG must be confident that the preferred option **will deliver digital connectivity within reasonably certain and not protracted timescales,** and that this must endure for the life of the cable.	The project objectives require assurance of continuity.
[redacted]	[redacted]	[redacted]
3. Support the benefits of competition	The existing situation is perceived to be characterised by a lack of affordability, choice and innovation in the Cayman Islands' digital markets arising from the status of the market for subsea connectivity as a natural monopoly. The preferred solution must support these factors.	The project objectives require the project to support digital inclusion and social / economic participation, as well as tourism.
4. Subsea costs	**The preferred option should leave the cost of subsea connectivity the same as or better than it would be in the absence of intervention by CIG.**	To support improved affordability for businesses and consumers, noting the wider dependencies that also affect delivery of this objective.
5. Inter-island connectivity	Digital inclusion and the support of social and economic participation across all three islands in the Cayman Islands is important. Radio connectivity is adequate to link Cayman Brac and Little Cayman. **The project must provide new connectivity to Grand Cayman and Cayman Brac.**	The project objectives require that the project support digital inclusion and social / economic participation.

13. In order to make the analysis clearer, the order in which the CSFs are considered below has been modified so that CSF 5, the requirement for inter-island connectivity, is considered first.

Critical Success Factor 5: inter-island connectivity

14. It is assumed that, by default, a new cable providing subsea connectivity to the Cayman Islands would land at a cable landing station in Grand Cayman. This is because Grand Cayman is the largest of the three islands, is home to around 97% of the Cayman Islands' population, and is therefore likely to be the principal source of demand for connectivity in the Cayman Islands.

15. Little Cayman and Cayman Brac, together known as the sister islands, are together home to the other 3% of the population of the Cayman Islands, with a population of 2,257 in 2021.

16. These figures are summarised in Table 2 below.

Table 2: population of the Cayman Islands[1]

	Population at 2021 census	% of total
Cayman Islands total	71,105	100
Of which, Grand Cayman	68,848	96.8
Of which, sister islands	2,257	3.2

17. At the moment, connectivity to Cayman Brac (and from Cayman Brac to Little Cayman, by radio) from both Grand Cayman and internationally is provided solely by the repeaterless system CJFS, and connectivity on the sister islands is therefore dominated by the owners of CJFS, Cable & Wireless Networks. In the absence of a new inter-island link, any benefits brought by a new cable to Grand Cayman (such as improved resilience, capacity or latency) would therefore only be accessible to the 3.2% of the population living on Cayman Brac and Little Cayman through continued use of CJFS.

18. Relatively few people as a percentage of the Cayman Islands' population live on the sister islands, and partly as a result of this connectivity can be seen to be particularly strategically important for the Cayman Islands Government. In particular, connectivity can support better delivery of education and educational opportunities on the islands, and could help to retain young people in the sister islands.

19. Work to develop this OBC has identified that decision-makers for the project appear to have four conceptual options with regard to ensuring connectivity for the sister islands. These are:

    - **Rely on existing CJFS infrastructure for continued connectivity for the sister islands.**
    - **Construct a stand-alone link between Grand Cayman and Cayman Brac to ensure continued connectivity (e.g. Option 15).** This option is illustrated at Figure 1.
    - **Construct a new subsea cable that delivers connectivity to both Grand Cayman and Cayman Brac (e.g. Option 2 or 3, with a branch to Cayman Brac).** This represents a refinement of the infrastructure options identified in the longlisting stage, and is illustrated at Figure 2. As described in the Financial Case, the marginal cost of adding a branching unit and further cable to land on Cayman Brac to a self-build cable is [redacted]
    - **Guarantee Cayman Brac and Little Cayman's continued connectivity through alternative technologies (e.g. low-earth orbit (LEO) or medium-earth orbit (MEO) satellite systems).**

[1] Cayman Islands 2021 Census Report Highlights, Economics and Statistics Office, page 4, Table 1.1D

20. One factor that can be considered by decision-makers in determining which of the above four approaches to pursue can be the cost per capita of providing additional resilience. The precise figures will depend on the infrastructure selected, but an example calculation is given in the box below.

Example of a 'connectivity cost per capita' calculation

The capital cost of delivering connectivity to Grand Cayman via a new subsea cable direct to [redacted] is estimated to be [redacted].

The population of Grand Cayman is 68,848.

Therefore, the capital cost per capita of providing connectivity to Grand Cayman is [redacted]/68,848 = [redacted]

The incremental cost of delivering the same connectivity to Cayman Brac by adding a branching unit to the new cable has been estimated at [redacted].

The population of the sister islands that would be served by this branch is 2,257.

Therefore, the marginal capital cost per capita of providing connectivity to Cayman Brac and Little Cayman via a branching unit is estimated at [redacted]/2,257 = [redacted]

21. The potential advantages and disadvantages of the four conceptual options are set out in the table below.

Table 3: advantages and disadvantages of options

		Pros	Cons
1	**Existing CJFS infrastructure**	Minimises additional cost for CIG Potential capacity on CJFS estimated to be high at [redacted] Sister islands maintain resilience as separate connections available both to Jamaica and Grand Cayman	Ongoing reliance on owner of CJFS for connectivity No guarantees over the future of the system
2	**New stand-alone link to Cayman Brac**	Provides additional resilience for the Grand Cayman to Cayman Brac Could be built separately from other systems. Estimated to be slightly lower cost than (3) — [redacted]	Does not secure additional international resilience for the

	Pros	Cons
		Cayman Islands as it brings no new international connection. Requires second cable to be landed on Grand Cayman Significantly higher cost per capita (of the sister islands) than a new, international cable to Grand Cayman.
3 Branching unit from new cable	Provides additional resilience for the Grand Cayman to Cayman Brac Requires only one cable to the landed on Grand Cayman	Does not provide additional international resilience for the Cayman Islands Significantly higher cost per capita of beneficiaries than a new, international cable to Grand Cayman.
4 Satellite systems (LEO or MEO)	May offer a lower cost option than a new inter-island cable, although this has not been explored as part of this OBC	Not yet fully proven technology in this context, in particular with regard to ability to scale over time.

22. In order that any of the infrastructure options in the 'self-build' or 'spur' categories could meet CSF 5 and deliver connectivity for all residents of the Cayman Islands, it is therefore necessary to build a link between Grand Cayman and the sister islands in addition to any other options assumed, or to pursue alternative connectivity solutions such as satellite systems. For this reason, the discussion relating to the remaining five CSFs assumes that:
    - Where a 'self-build' cable is assumed to be built, it is assumed that a branching unit with a separate spur to Cayman Brac is constructed as part of that project.
    - Where a 'spur' option is assumed to be built, it is assumed that infrastructure Option 15, the new link between Grand Cayman and Cayman Brac, is also constructed as a separate project.
23. In recognition of the fact that a new link to Cayman Brac and Little Cayman from Grand Cayman adds to the costs associated with the project, analysis presented in the Financial Case (and later in this Economic Case) includes modelling both with and without an inter-island link.
24. Although market engagement with suppliers of satellite technology is outside the scope of work on this OBC, which focuses on the case for subsea cables, given the high cost per capita of extending a new cable to Cayman Brac and Little Cayman, this business case recommends that work is undertaken to establish the cost and technical viability and suitability of providing resilience capacity to the sister islands by satellite, before a final investment decision on a new cable is made.

Critical Success Factor 1: continuity

25. CSF1 requires that CIG must be confident that the preferred option will deliver digital connectivity within reasonably certain and not protracted timescales.

Spur options

26. The market for subsea cables is characterised by a range of solutions and proposals for new subsea cables, many of which are never delivered. It is therefore reasonable to assume that several of the potential third-party cables identified in the Strategic Case of this OBC would never, be built.

27. The reasons for this predominantly relate to the challenges of cable promotors of identifying and securing commitments from so-called anchor tenants, who make a contractual commitment to purchase capacity on a new cable in advance of its construction. This initial contractual commitment can often represent a 'tipping point', allowing the cable to be financed and, consequently, increasing other parties' certainty in its delivery and hence their willingness to contractually commit to it. However, many cables that are promoted struggle to secure anchor tenants, and are thus unable to raise the finance necessary for their construction as commercial financers may be unwilling to lend against demand that it not guaranteed, or may charge prohibitively high rates to do so.

28. The nature of the market for third-party cables means that CIG cannot be entirely confident in any third-party cable reaching acceptance.

29. However, while it does not appear possible for CIG to be reasonably certain of delivery of any specific one of the individual spurring options, CIG may determine that it is reasonably certain that at least one of the options will be delivered. CIG may therefore choose to pursue several options simultaneously in the expectation, that at least one will proceed to delivery.

Self-build options

30. Two self-build options are short-listed: to [redacted] and [redacted]. Other than the difference in the lengths (and therefore costs) of the cables, the principal difference between the two options relates to the issue of onward connectivity from the remote Cable Landing Station ('CLS' — near the beach in either [redacted] or [redacted]) to [redacted] which as described in the Strategic Case of this OBC represents the optimal ultimate 'destination' for any new Cayman Islands connectivity.

31. In the case of [redacted] it is envisaged that backhaul connectivity from the CLS to the [redacted] could be relatively easily obtained as part of an agreement with a [redacted]. There are multiple and competitive routes that such connectivity could take, and would be considered an entirely routine requirement when sought as part of a commercial negotiation with potential landing parties. It would alternatively be possible for CIG to directly lease connectivity between a cable landing station and [redacted], either by [redacted]. However this would be an unusual approach — it would be more usual to secure this onward connectivity through a commercial deal with a landing party.

32. In the case [redacted], onward connectivity to [redacted] is more complex (there is understood to be [redacted] that could be used in place [redacted]. This complexity arises from specific factors relating to the market [redacted]:

    - Direct routes between [redacted] are understood to be limited.
    - A guarantee that onward connectivity to [redacted] is possible would need to be achieved before an investment decision in a cable to [redacted] made by CIG, though securing an Irrevocable Right of Use contract with a third-party provider — otherwise there is a risk that no onward connection would be possible, or only at extortionate prices, leaving a highly sub-optimal cable.
    - Any guarantee relating to a cable that already exists would, by its nature, rely on infrastructure that is older than the new CIG cable, and is therefore at risk of life expiry before the CIG cable — potentially leaving the CIG cable 'stranded' with no onward connectivity to [redacted] later in its life. [redacted]

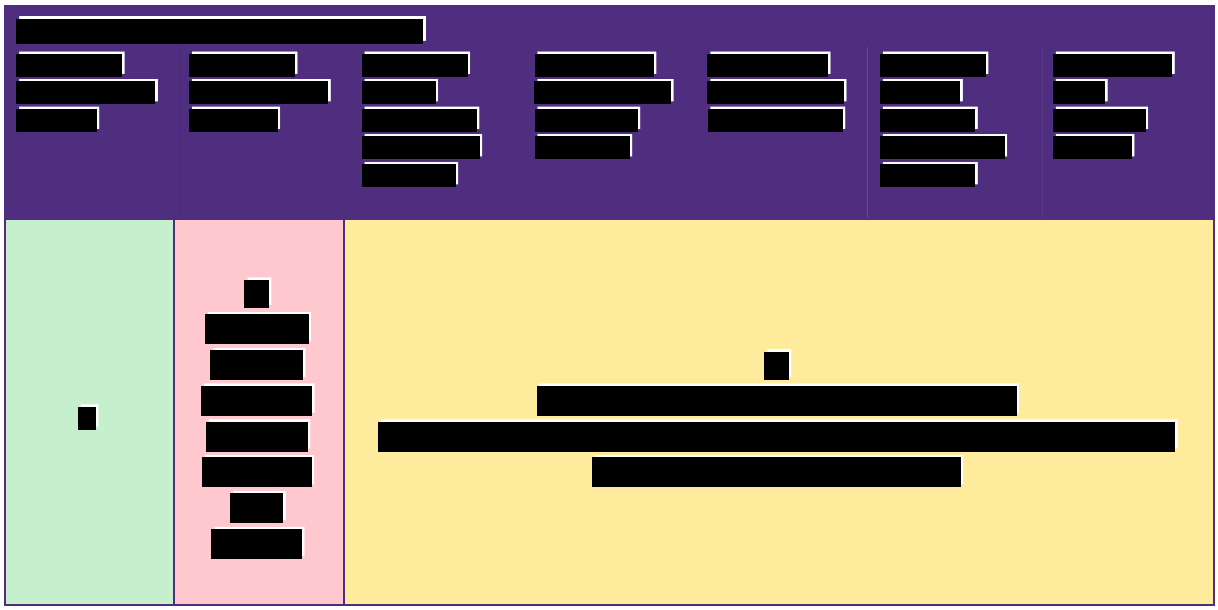
[redacted]

- Any guarantee relating to a cable that had not yet been constructed would be subject to the same uncertainties as described above regarding ‘spur’ options — it may never be built. The options mostly comprise cables which have been identified as the basis for potential spur options but the uncertainty associated with these cables would translate into much greater financial risks if the approach to integrate with them were based on a lengthy, independent self-build cable to [redacted].

33. For these reasons, while [redacted] is technically a ‘self build’ option, in practice the risk profile that it presents more greatly resembles an independently-built spur option (which can be considered to carry a greater degree of risk than a conventional spur option, as the risk is not shared with another provider).

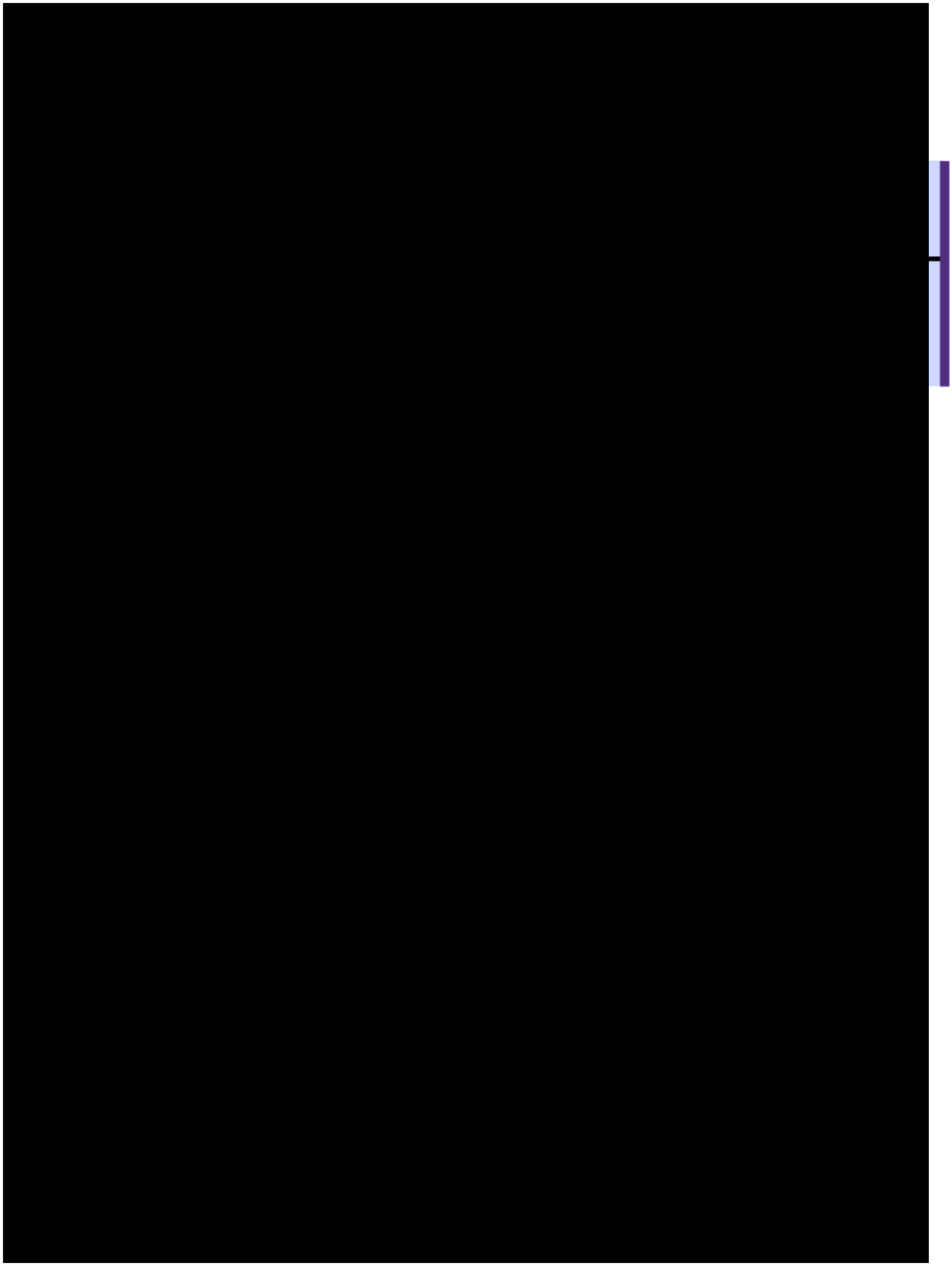
34. Given the significantly higher costs [redacted] than the other spur options, it appears a sub-optimal solution and is therefore not considered further. Similar issues would be associated with speculative cables to other locations [redacted], where existing backhaul to the US is dominated by a single provider currently and while this might change in future it would be commercially sound to progress discussions with potential developers of cables than to proceed with a speculative, independent link.

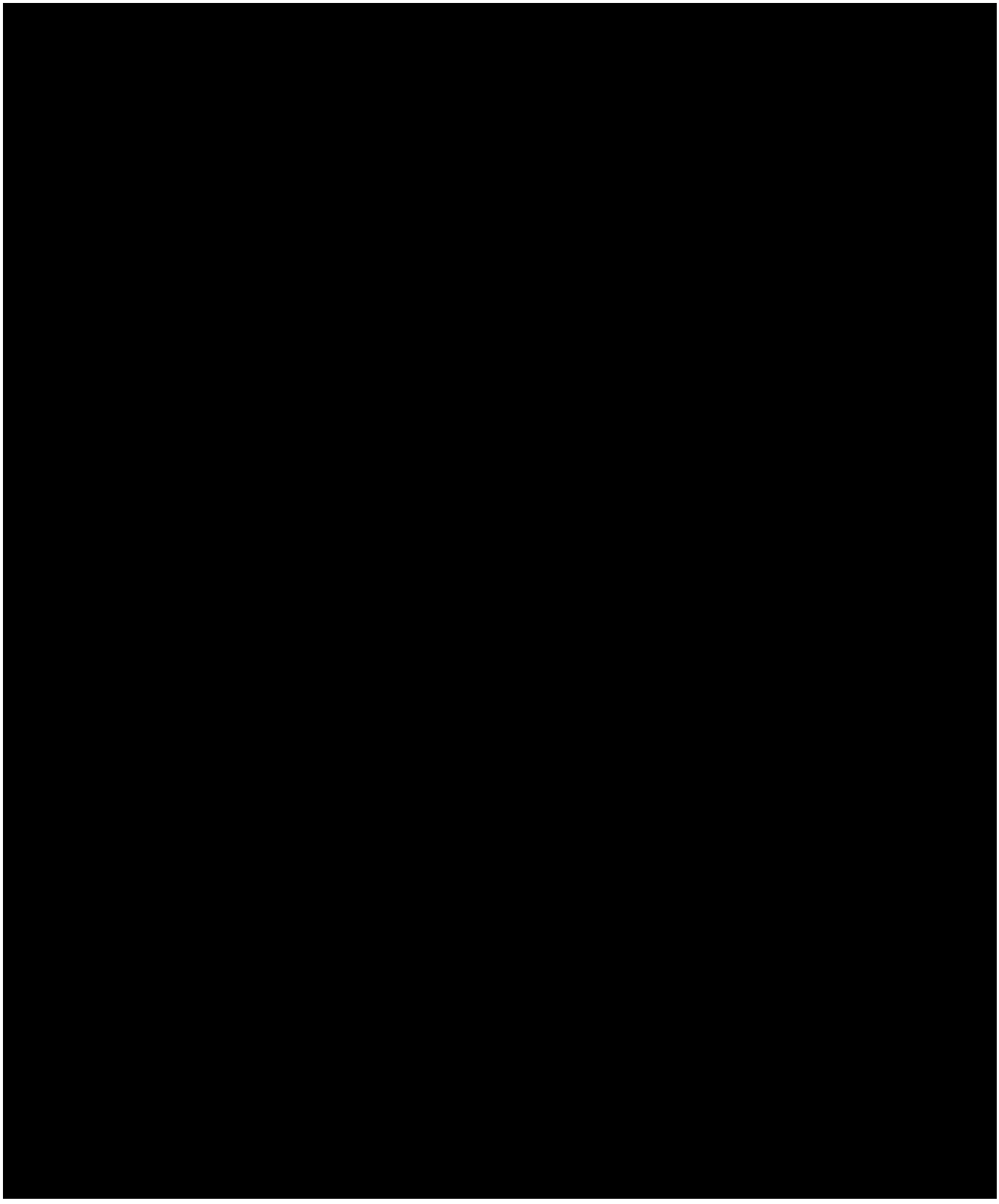
[redacted]

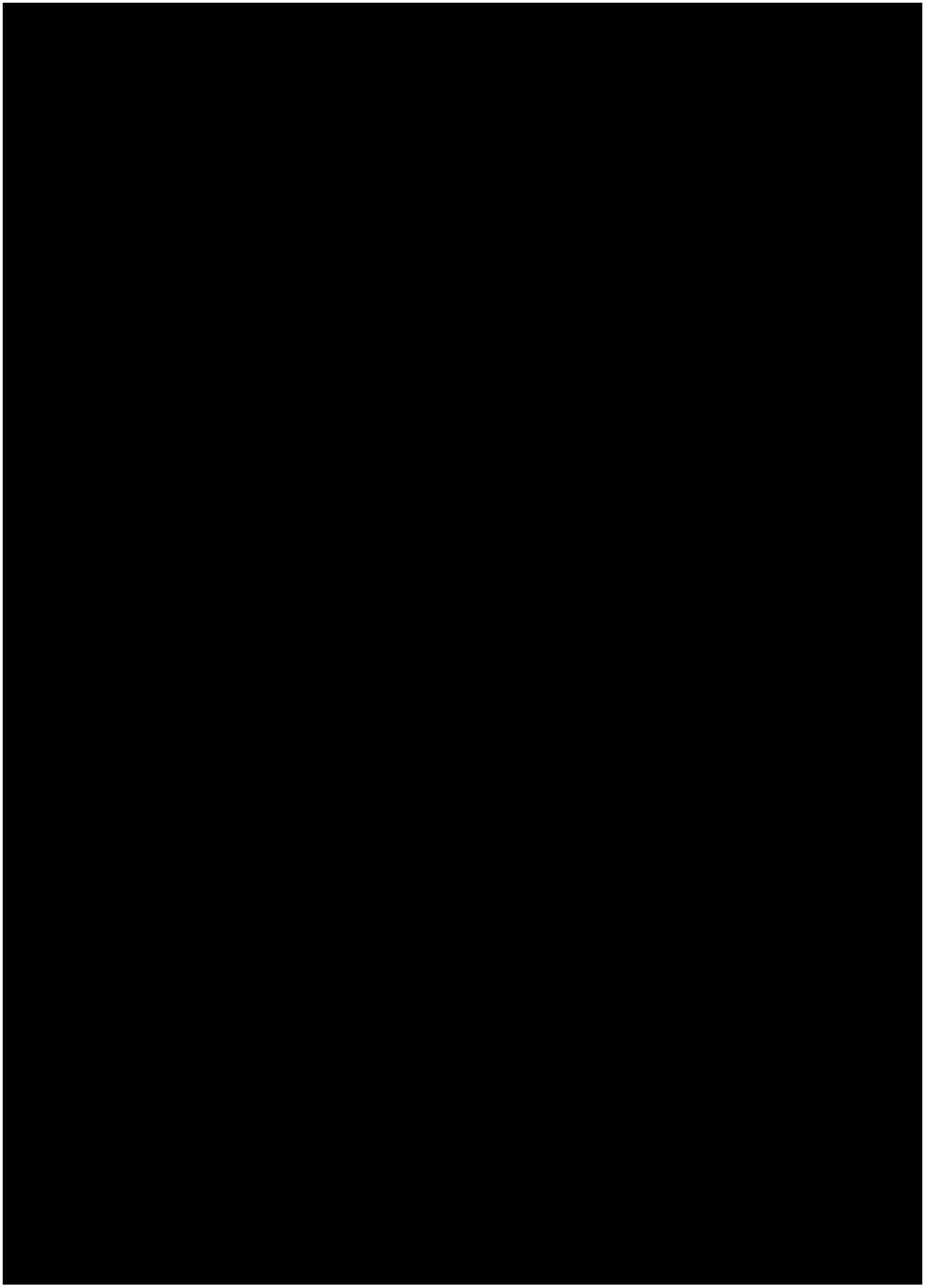


Critical Success Factor 2: cable resilience

[redacted]







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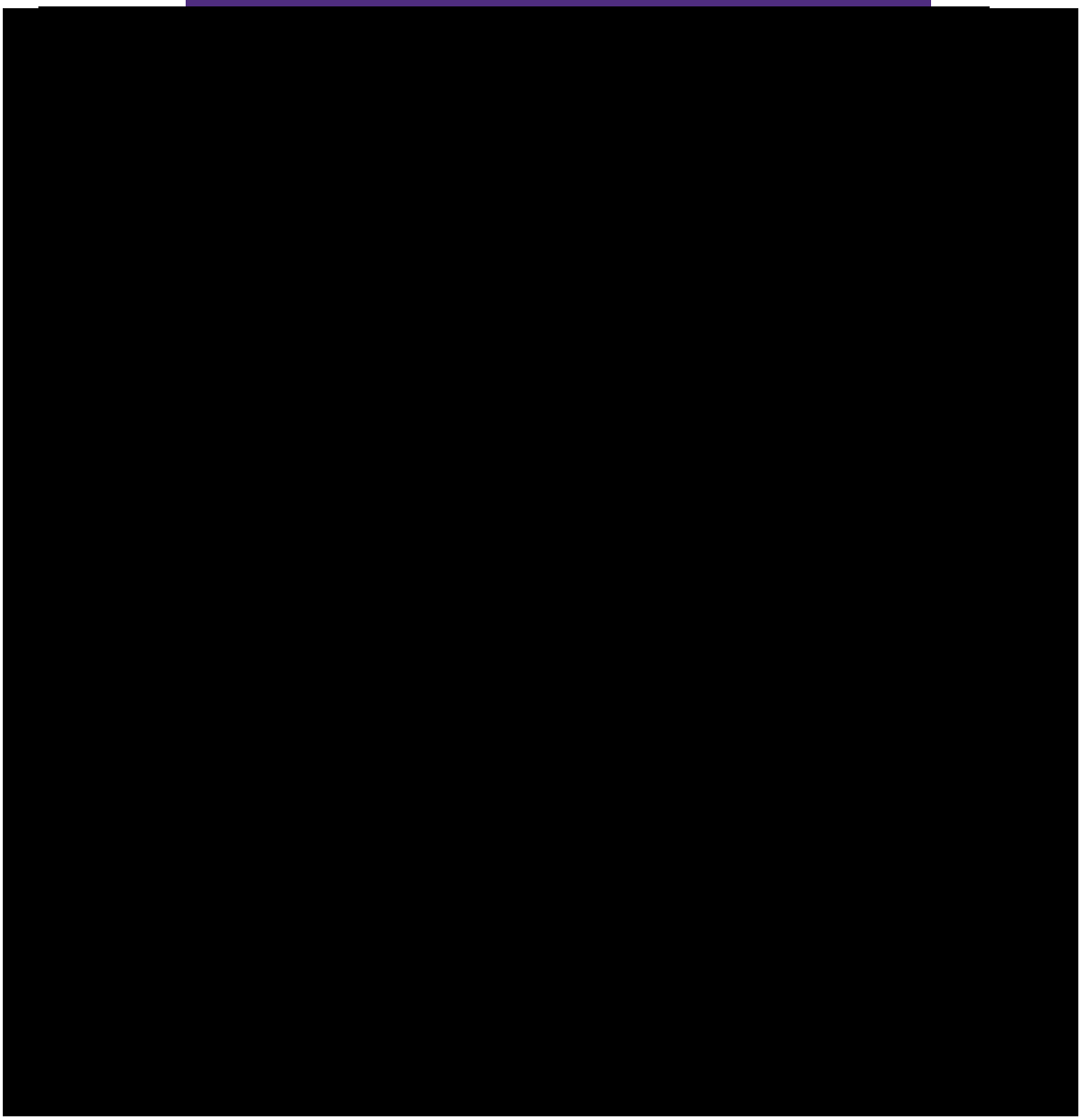


Critical Success Factor 3: support the benefits of competition

49. As described in the Strategic Case, the market for international digital connectivity on the Cayman Islands has the appearance of a natural monopoly, which is to say that the barriers of entry to the market (specifically, the installation of a subsea cable) are high and the market it serves is limited in size, that typically only two operators can be supported. The reason that two (rather than just one) providers can operate as dominant providers in the market is because consumers of digital connectivity typically require not only a principal oversees connection, but also a secondary alternative connection for resilience, so that connectivity is not lost if one system develops a fault.

50. The precise features of natural monopolies varies from case to case, but economic theory suggests that such markets can typically display certain characteristics that are undesirable from a consumer's perspective. These include:

    i. **A lack of competitive tension in pricing**, meaning that in the absence of effective regulation, consumers may be charged a higher price than they would pay under a competitive market.

       Economic theory suggests that this may be because a dominant provider is able to charge supernormal profits, and is incentivised to produce output up to the point at which its marginal cost is equal to its marginal revenue. This is different from a competitive market, where output will be supplied up to the point at which the average revenue from a product is equal it is average cost — a price point that is typically lower.

    ii. **A lack of cost control.** Where a supplier does not face competition, internal incentives to ensure tight cost control may be more limited than in competitive markets.

    iii. **A lack of choice for consumers.** Where there is only one supplier of a product in the market, there is no ability of consumers to move to a different supplier if their needs are not met. This can lead to a lack of incentives on the supplier to work hard to meet the needs of customers, and can lead to a 'take it or leave it' supplier mentality. This leads to:

    - **Limited customer focus.** As a consequence of the lack of choice for consumers, there is little incentive on a dominant provider to provide a high quality or responsive customer focus. This can be inefficient and frustrating for customers.
    - **Lack of flexibility.** Related to the 'take it or leave it' supplier mentality that can be engendered in monopoly markets, there can be little incentive on dominant suppliers to vary the products on offer to the market.

    iv. **Lack of research, development and innovation.** Given dominant suppliers typically do not have to compete for market share, there is typically little incentive on them to invest in developing or improving the customer offer until it is financially optimal for them to do so.

51. In the absence of CIG intervention, and in a scenario where one of the existing cable systems is decommissioned and a new private sector provider enters to the market to become a dominant provider of connectivity alongside the remaining legacy system (because, as described above, the market appears capable of supporting two dominant providers), consumers on the Cayman Islands risk being subject to the features of a monopolistic market over the long term.

52. Analysis in developing this OBC suggests that there is little difference between the infrastructure options with regard to the ability of a new CIG-controlled subsea cable to address each of the listed features of a monopolistic market effectively. (The arguments for the cable being owned by a CIG-controlled company are set out in detail in the Commercial Case of this OBC.) What principally matters, rather than the nature of the infrastructure itself, is the way in which the capacity that a new cable provides is managed and commercialised.

53. The approach to mitigating each feature of a monopolistic market is described in more detail below.

[redacted]

[redacted]

Limited focus on cost control

56. A government-owned company's performance with regard to cost control is likely to depend to a significant degree on the extent to which it is placed under scrutiny and managed by its sponsor, CIG. Effectively managed and sponsored, it might be reasonable to expect Cable Co to deliver superior cost control to a private sector supplier in a position of market dominance.

Limited customer focus

57. A government-owned company's performance with regard to customer service might be expected to be strong, on the basis of the socially-driven nature of the enterprise, where the purpose of the company is to deliver for the people of the Cayman Islands rather than to deliver profit to its shareholders. This could be tied in detail to the company's mission statement and values.

58. The company's performance with regard to customer service could be monitored through regular customer engagement (potentially through surveys of customers, for example), and the CIG could hold the company to account through the governance processes it introduces. For example, the level of customers' perception of the quality of Cable Co's customer service could be tied to:

    - the level of autonomy that Cable Co is granted from CIG, where a higher-performing company could require a lower level of direct oversight than if it were performing poorly
    - performance ratings for relevant members of staff
    - financial or other compensation for members of staff.

Lack of flexibility

59. The principal elements of the customer offer that could be applied flexibly with regard to subsea cables are:

    - **The granularity of capacity offered –** A future dominant provider may only be willing to sell capacity in 'chunks' of 10Gbps. This may represent a significant barrier to entry for new entrants to the on-island ICT market, who may only have sufficient demand to justify purchasing a fraction of this. A new Cable Co, in support of its social mandate from CIG, could offer capacity to the market in any (or even flexible) package sizes.
    - **The duration of commitments –** Cable Co could offer capacity to be purchased for any duration required by the market, and (potentially unlike a future dominant provider) may not require extended contract lengths. This could reduce barriers to entry for new participants in the Cayman Islands ICT markets.

[3] For further discussion see articles by John de Ridder at https://deridder.com.au/wp-content/uploads/2020/02/Economuse-2020-02-12.pdf and https://deridder.com.au/wp-content/uploads/2020/10/Pricing-for-Abundance-Preprint.pdf

Lack of research, development and innovation

60. Without CIG incentivisation, the incentive for research, development and innovation of a CIG-owned Cable Co might be no higher than a provider in a position of dominance. As with customer service, however, the level of research, development and innovation required of the company could be specified by CIG, which could also hold the company to account for its performance.

61. This area is likely to be of particular relevance when Cable Co is considering its commercial offer to consumers, where it may be in a position to undertake market engagement to consider how best to package and sell the capacity available. This could include, for example, considering the ability to deliver volume-based pricing as described above.

Table 6: conclusions with regard to CSF3

CSF3: support the benefits of competition
[redacted]
✓ With appropriate instructions and mandate for a government-owned SPV, all options could support the benefits of competition

Critical Success Factor 4: subsea costs

62. CSF4 requires that the preferred option should leave the cost of subsea connectivity the same as or better than it would be in the absence of intervention by CIG. This requires an assumption to be made about what the price of subsea connectivity would be in the future, in the absence of intervention.

63. For the purpose of this business case, a general assumption has been made that market prices charged per Gbps would decline to exactly offset background demand growth over time, so that revenue income for any party remains constant in real terms (i.e. disregarding average prices inflation in the economy), unless additional consumers are introduced or changes to captured market share. All price points quoted are therefore the projected revenue expressed per 10Gbps of assumed existing equivalent market share.

64. In a future scenario in which CIG does not intervene, two distinct periods of time can be assumed:

- **Short term - Continuation of today's situation**

  Initially, in the absence of intervention, it is likely that today's situation will endure. During this period, it appears likely that pricing of subsea connectivity would be unchanged from today.

  The price of subsea connectivity today is challenging to discern and is not openly published by the incumbent provider. It does not appear to be consistent and may vary according to the purchaser. On the basis of research conducted in assembling this OBC, the project team considers that a price of [redacted] per 10Gbps per month[4] appears to represent a 'good' price for a new entrant to the market on the Cayman Islands today but some capacity may be purchased for more or less than this rate depending on diverse commercial deals in place.

  Note that it appears likely that it would be possible for the incumbent to sell capacity on the existing infrastructure at a lower price than [redacted]. On the basis of analysis of the possible cost-base of the incumbent, it is possible that the owners of existing infrastructure might be able to charge less than [redacted] in future, although it is not possible to assess precisely the price level the incumbent could charge, given the lack of information available about its cost base.

- **Medium to long term – Uncertain entrant of new supplier**

  At some point, it appears likely that the MAYA-1 system will be decommissioned, potentially as several of the consortium members decide to leave the consortium, leaving the remaining members with unattractively high operations and maintenance costs.

  [redacted]

  Modelling in the Financial Case of this OBC assesses the price that a new entrant would need to charge to recover its costs of building a new cable (including a commercial cost of capital), in the absence of CIG intervention. The analysis assumes that a private sector operator invests to bring a spur from a third-party cable to the Cayman Islands, and finds that it would need to charge a price of [redacted] per month per 10Gbps of assumed existing equivalent market share, in order to recover its investment, pay an [redacted] cost of capital, and service the ongoing operations and maintenance requirements of the cable. The assumptions underlying this figure are explained in detail in the Financial Case.

  Whether or not a new entrant would in fact enter the market, and the time at which they would do so, are inherently uncertain.

[4] All prices are given in $USD per 10Gbps per month unless otherwise stated.

65. This means that any option that requires revenue of [redacted] per 10Gbps of assumed, existing equivalent market share to be generated can be considered to meet CSF4 in the medium to long term, as it would represent an improvement on the estimated price that would need to be charged for capacity on a new cable if one were to be delivered as a private venture (which is uncertain).
66. Modelling in the Financial Case assesses the revenue requirement for different infrastructure solutions under different financing approaches if the funding and finance costs are to be recovered over an operational period of 25 years. The results of this analysis are summarised in the diagram at Figure 11. No option appears able to compete for market share or deliver improved pricing in the market in the short term. However, the diagram shows that a spur option might compare well with the potential pricing from a new, commercially developed cable, whether funded by government debt or government grant. A self-build option to [redacted] beats this price when funded by government grant, but does not manage to do so when funded by government debt.
67. The Financial Case estimates that capacity on a self-build [redacted] link only require revenue consistent with the 'indicative maximum acceptable price' if it were financed by a loan from CIG at an interest rate [redacted]. Charging interest at a rate below the government cost of borrowing in this way may increase the risk of market participants raising challenges to the government's participation in the market.

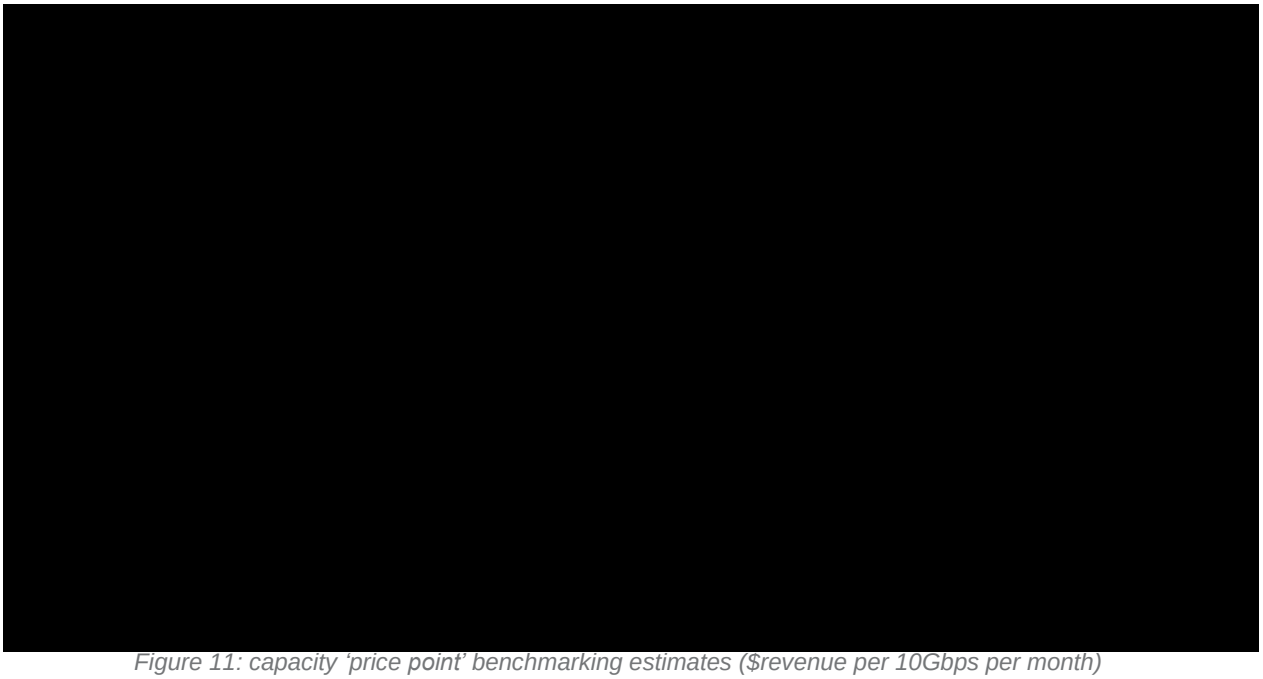


Figure 11: capacity 'price point' benchmarking estimates ($revenue per 10Gbps per month)

68. The conclusions with regard to CSF4 are set out in the table below.

Table 7: conclusions with regards to CSF4

CSF4: subsea [redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Grant funded	✓	✓	✓	✓
Debt funded below government cost of borrowing	✓	✓	✓	✓
Debt funded at [redacted]	✗	✓	✗	✓

Summary of findings

69. The following conclusions can be drawn from the discussion in this Section C.

- In order to achieve a level of resilience for all three of the Cayman Islands [redacted]
- Considered as <u>individual</u> options, the self-build [redacted] option provides the highest level of confidence to CIG that continuity of connectivity can be achieved. This is because:
    - a [redacted] option relies on securing onward connectivity on a third-party cable from [redacted]. Existing systems that could provide this are likely to be decommissioned before the life of a new cable expires; and at this stage there is no certainty that any new system that could provide this onward connectivity will be delivered.
    - there is no absolute certainty of delivery with regard to any specific one of the spur options under consideration.
- However, a <u>provider-agnostic approach</u> to the spur option, under which negotiations with multiple potential providers are entered into may provide CIG with a reasonable level of confidence of delivery of continued connectivity.
- Financial modelling indicates that even with the advantages to CIG arising from a lower cost of capital, the revenue that a [redacted] link with a link to Cayman Brac would need to generate in order to recover its costs and pay for its ongoing operation and maintenance would be higher than that which a third-party provider is likely to require to finance infrastructure similar to the spur options (without a link to Cayman Brac) considered in this business case. The self-build [redacted] link with a link to Cayman Brac does not therefore appear viable unless a degree of government subsidy is introduced. This could improve the cost of the link's capacity for consumers, but is considered likely to heighten the likelihood of other market participants raising concerns about the Government's participation in the market. This risk may outweigh the uncertainty with regard to the delivery of spur options.

- Whichever approach is taken, it is the way in which capacity is packaged and sold to the market that will have the greatest effect on supporting the benefits of competition in the Cayman Island' ICT markets, rather than the nature of the infrastructure solution pursued.

D. Economic impacts and benefits identification and appraisal

70. This section considers the economic costs and benefits to the Cayman Islands that would arise from improved subsea digital connectivity and presents cost benefit analysis on a range of options.

71. The Cayman Islands enjoys a vibrant and modern economy, to which international data connectivity is crucial. In 2020, the Cayman Islands had a GDP of approximately CI$4.1 billion. This was only slightly down from CI$4.3 billion in 2019 which resulted from the Covid-19 pandemic and the economy is now expected to be recover quickly. The international financial and insurance sector is the largest contributor to GDP, making up 38% of all economic activity, with the professional, scientific and technical activities sector being the second largest contributor, making up 15% of all economic activity.

72. During the first nine months of 2021, there was an expansion in the financial services industry with improvements recorded in all key indicators, such as insurance licences, mutual funds and stocks listed on the Cayman Islands Stock Exchange – the only indicator that saw a decline was the number of bank and trust licensees. Some of this growth has been driven by increased digitalisation of the financial sector (e.g. electronic trading and exchanges, including for crypto currencies) and the digital sector is viewed as a key economic opportunity for the islands. Supporting this is the Cayman Islands' relatively stable political environment, clear and mature legislative backdrop, and advantageous fiscal policies. New company registrations for January–September 2021 increased by 50.3% to a record 12,848. Real estate activity contributed to 9% of total economic activity, and during the first three quarters of 2021, the total value of property transfers increased sharply to CI$1.1 billion, its highest value on record. During this period, the number of work permits issued also increased by 1,056 (4.2%) to 25,946.[5]

73. The strength of the Cayman Islands economy, as well as its internationally connected and increasingly digitally-enabled nature, means that certainty, resilience and adequacy of future international digital connectivity is critical. For the purposes of economic assessment, the principal economic effects arising from a new subsea cable are an increase in resilience, improved pricing and customer quality of telecommunications products, driven by the competitive market that a new cable could support. This unlocks key benefits to businesses, consumers, and the Cayman Islands Government as illustrated in Figure 12: economic benefits of a new submarine cable.

74. A new cable would also bring significant additional digital capacity to the Cayman Islands. The extent of the economic benefits that this would bring depend on whether, in the absence of intervention, capacity on the existing infrastructure would be reached. It is not clear whether, or if, this would occur. This is because:

    - maximum technical capacity on the CJFS system is believed to be [redacted], which would provide the capacity required for several decades
    - the incumbent provider's maximum capacity on the MAYA-1 system is understood by CIG to be [redacted] but the extent to which it may be possible to further increase capacity in the future is unclear

    Because of this uncertainty about the extent to which a new cable would provide capacity that would otherwise be absent, these benefits have not been monetised in this economic case.

[5] Cayman Islands Economic and Statistics Office economic performance reports

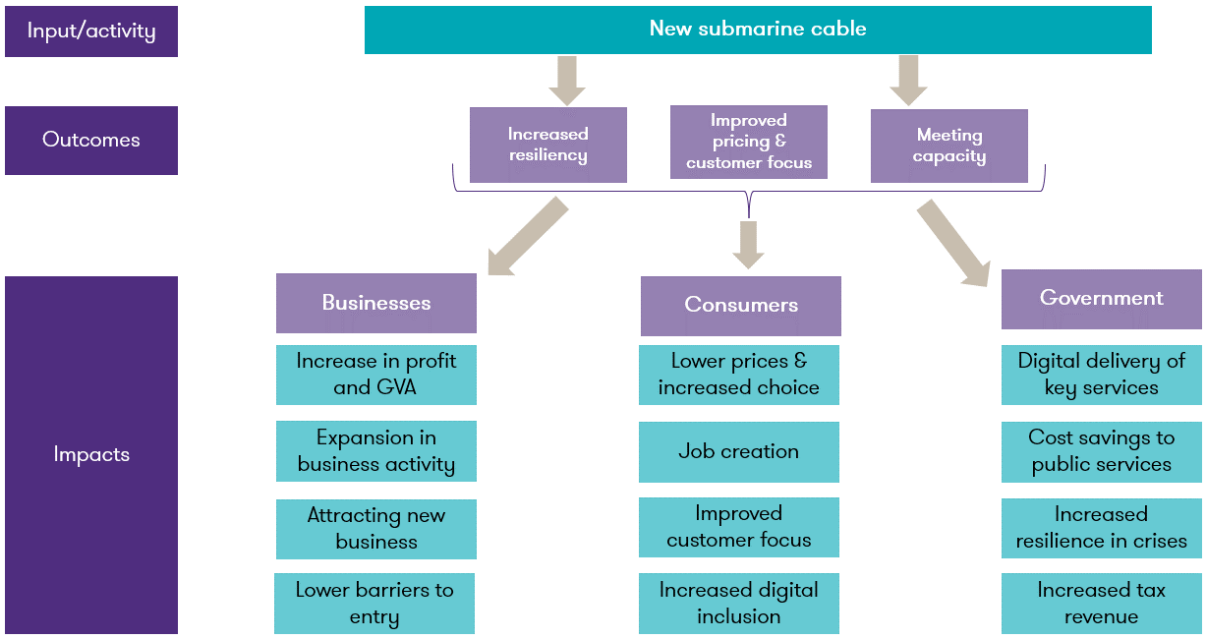


Figure 12: economic benefits of a new submarine cable

Do-Nothing or 'counterfactual' scenarios

75. Economic appraisal must be conducted against a Do-Nothing scenario – a presumed 'counterfactual' scenario representing what would happen if the proposed intervention were not to be made. For the purpose of this business case, there is significant uncertainty about the Do-Nothing scenario, which must be accepted and taken into account in decision-making.

76. In the Management Case of this OBC, an assessment is made of the future lifespan of the two existing international subsea cables. This concludes that there is a risk of at least one of these cables – MAYA-1 – being decommissioned in the relatively near future. This business case envisages two possible 'do-nothing' scenarios against which both the CIG intervention options can be appraised. In practice it is uncertain which scenario would occur and the benefits of intervention would be manifest in different ways, depending on which scenario would have occurred. The scenarios relate to whether or not a new cable would be developed on a commercial basis by a private entity to replace any existing cable promptly when it is decommissioned.

Counterfactual scenario 1 – no replacement of decommissioned cable

77. In Scenario 1, where it is assumed that there is no private sector investment in a new cable to replace MAYA-1, [redacted] are unlocked by CIG intervening and providing a new cable.

78. There would be limited impacts as a result of price changes under this scenario as it is assumed that ISPs would be purchasing two connections, both on CJFS and the new cable provided by CIG, and therefore would need to purchase at both price points for the two cables.

Counterfactual scenario 2 – replacement of the decommissioned cable by a private sector provider

79. In Scenario 2, where it is assumed that a private provider replaces MAYA-1, there would be no benefits of [redacted] as the private provider replacing MAYA-1 would anyway have unlocked those benefits.

80. In this scenario, it is assumed that benefits to the ICT market on the Cayman Islands would be unlocked by CIG providing a new cable to replace MAYA-1 instead of a private provider in a dominant market position. This is due to CIG having an incentive to be fully customer focused and potentially being able to offer a lower price point than the private provider who has replaced MAYA-1. This is by comparison to a private sector provider which may be motivated mainly by supporting affiliated telecoms providers rather than viewing competitors as customers, as well as

having to cover a normal private sector cost of capital, which would be higher than that of government (further discussion below).

81. [redacted]

82. Note that the counterfactual scenarios represent the **scenarios in which the Government does not intervene**. The appraisal carried out below then compares how the costs and benefits of the two Government intervention options ([redacted]) differ to both of these counterfactual scenarios.

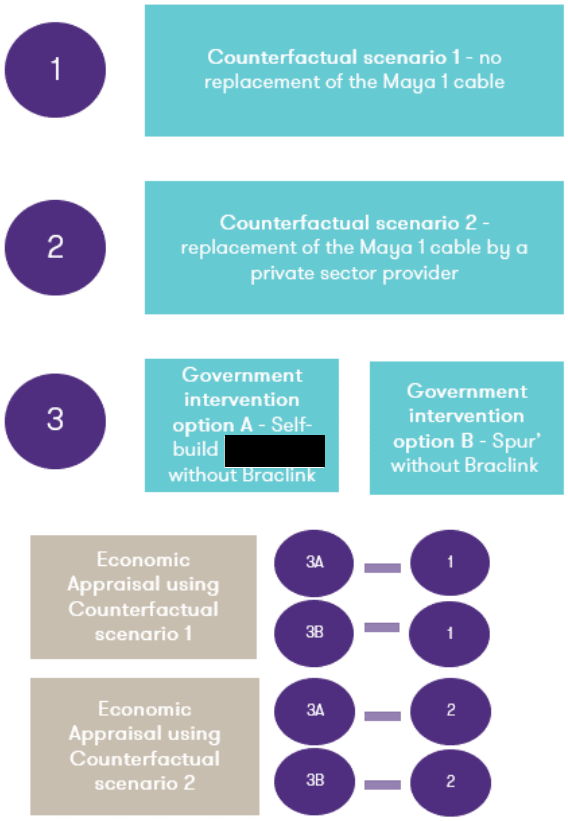


Figure 14: economic appraisal scenarios

83. The policy objectives outlined in the strategic case highlight that one of the main reasons for intervention is to assure resilience of data connectivity, given that CIG knows of no verified plans for third parties to land further subsea cables on the Cayman Islands. For that reason, **the main analysis is presented against the counterfactual scenario where it is assumed that there is no new investment by the private market.** However, given the uncertainty of this assumption, scenario analysis is carried out below to assess how the impacts would be affected, had there been private sector investment in a new cable in the alternative counterfactual option.

Competition and the impact on private sector providers for both counterfactual scenarios

84. Competition is also a key consideration as part of the decision-making process, and the price-setting mechanism that the government chooses to adopt is crucial to determining the final impacts. The Financial Case of this OBC assesses the revenue requirements for different infrastructure options and funding approaches. It shows that 'spur' options could require less revenue than a hypothetical private provider would require. The Government could also, in theory, deliver the [redacted] option and provide an advantageous price point by not seeking to recover its full costs from the market as revenue, which could stimulate local economic activity through business expansion, increased consumer activity and digital inclusion – this is if the local benefits outweigh the cost of doing so. We have been unable to monetise the economic impacts as a result of price changes, due to limited data availability of the current pricing strategy in the on-island telecoms market at this stage. For the Final Business Case, if information can be made available, we suggest carrying out this analysis by understanding the price changes and elasticities of different telecommunications products and services, calculating the increase in consumption and translating this into GVA impacts.

85. If the government decides not to recover its full costs of delivering a new subsea cable, consideration would have to be given to the impact on the competitive market for delivering international subsea connectivity. This should, however, be balanced with the knock-on impacts of lower prices to the wider economy as a whole. The benefits unlocked by lower prices

(discussed in sections below) may outweigh the foregone revenue. As part of the Final Business Case, if there is more data availability on the price change, we recommend carrying out a competition assessment.

Economic appraisal against counterfactual scenario 1 – no replacement of the MAYA-1 cable

Options

87. As outlined above, for the main economic analysis, we carry out cost-benefit analysis on the options set out in the table below.

Table 8: Overview of options analysed

Number	Description
0	Do nothing ○ MAYA-1 becomes economically life-expired in year [redacted] this is an assumption based on the discussion set out in the Management Case regarding the life expectancy of the existing infrastructure ○ CJFS continues potentially indefinitely ○ **There is no investment in a new cable to replace MAYA-1 by the incumbent or a new private provider**
1	Self-build to [redacted] without link to Cayman Brac
2	'Illustrative Spur' without link to Cayman Brac

88. As with other cases of this OBC, the estimated costs of the [redacted] option have been used to illustrate costs associated with spur options.

Net Costs to Government

89. Table 9 below presents the total discounted costs of the options. Discounting allows us to compare costs and benefits with different time spans to be compared on a 'present value' basis. These costs are consistent with the costs presented in the financial case, but have had inflation removed and have been discounted by [redacted], in order to calculate the true economic costs. They have been calculated over a [redacted] time period, assuming that [redacted] (this being the development and construction period plus an assumed 25-year operational life).

[redacted]

90. For the purposes of this appraisal, we have also considered the revenue benefits to CIG, in addition to the do-nothing option, that are gained through providing telecommunications services. The financial case presents a range of hypothetical scenarios where the revenue requirement has been set so that a cash balance of 0 is achieved over the full 25-year life of the asset. This results in a higher revenue requirement for the options that are more expensive. For this appraisal, we have assumed a consistent, indicative scale of the revenue benefits to CIG across all options, based on those calculated in the financial case for the debt funded 'Illustrative Spur' option. This has been used for illustration purposes and enables a fair comparison between all options introducing differences in price point would only create differences in 'transfer payments' – equal and opposite impacts of different parts of the economy.

[6] Source: economic modelling conducted for this OBC on basis of infrastructure costs estimated by Pioneer Consulting

91. Before the MAYA-1 cable becomes economically life expired, the revenue benefits to CIG would be constrained by competition. In the scenario that the CIG does make any revenue, this would result in an equivalent private sector disbenefit. Therefore, any revenue benefits to CIG prior to the MAYA-1 cable's expiry [redacted] have not been included in this appraisal.

92. The table below presents the total net costs to CIG for each option. It can be seen that the [redacted] option has the highest net cost with the 'Illustrative Spur' option having the lowest net cost, which is relatively close to zero.

[redacted]

Costs to consumers, businesses and ISPs

93. The additional revenue benefits that are attained by CIG [redacted] are a transfer from consumers, businesses and ISPs, and therefore would translate as a cost to these groups. In the analysis, these effects would net off against each other in the Net Present Value.

Monetised benefits arising from increased resilience

94. This appraisal monetises the benefits associated with increased resilience.

95. An increase in resilience will lead to a lower number of disruptions and a lower duration of each disruption, leading to an increase in GDP, across all two options.

96. Using industry knowledge, Pioneer Consulting have provided a cautious estimate that on average, there is currently 1 fault for every [redacted], with a fix duration of 10-14 days, which will be avoided by the new connectivity provided by the options under consideration. Given that Pioneer have suggested that this is a conservative assumption, for this analysis, we assume that it will take 14 days for repairs.

97. Industry research found that the economic consequences of a temporary shutdown "grow larger as the level of connectivity and GDP increase." For highly connected countries, a temporary shutdown could cut 1.9% of daily GDP.[8]

98. In 2020, the Cayman Islands had a GDP of $5.7 billion, which is equivalent to a daily GDP figure of $15.6 million[9]. As the options exclude the link to Cayman Brac, using population weighting, 97% of the total Cayman Islands GDP is assumed to be in scope for this analysis, which equates to $5.5 billion and a daily GDP figure of $15.1 million. Assuming that all goods and services sectors will be impacted in some way by network disruptions, this could translate to a potential daily GDP impact of $288,000 in 2020. Assuming a 2.7% annual GDP growth rate[10], over a 28-year time period, this

[7] Source: economic modelling conducted for this OBC on basis of infrastructure costs estimated by Pioneer Consulting
[8] The economic impact of disruptions to Internet connectivity: A report for Facebook | Deloitte
[9] Note that these figures were presented in 2015 prices in the Economics and Statistics Office publications and have been inflated to be presented in 2022 prices
[10] Note that this is the average GDP growth rate of Cayman Islands between 2011 and 2018 and is likely to vary. 2020 was excluded due to the adverse impacts of Covid. This is also likely to be an underestimate as it does not include the bounce back of GDP as a result of economic recovery post-Covid

would mean that the Cayman Islands could experience a loss of $59.6 million. Applying a [redacted] discount factor, provides a [redacted] that is brought about by the resilience of the new cable.

99. We have carried out the following scenario analysis to understand the potential impact arising from sectors that are at a higher risk to network disruptions, due to having a higher dependence on connectivity. We assume that the 'Information and Communications' and 'Financial & Insurance Services' sectors are high risk sectors and for illustration purposes, we assume that 70% of their activities require international connectivity. The total GDP of these sectors are $2.1 billion, which is 38% of total market share. The total GDP that is related to international connectivity is therefore $1.5 billion.

100. We carry out two hypothetical scenarios to estimate what the potential total impact would be if the high-risk sectors experienced a 10% or 20% reduction in daily GDP, with the remaining sectors experiencing a 1.9% reduction in GDP. This analysis indicates that the total impact on GDP (discounted) could be between $61.9 million and $102.1 million.

101. Note that this benefit would be equivalent for both options.

Table 11: analysis of benefit from increased resilience[12]

Sensitivity	Reduction in daily GDP for high-risk sectors	Total discounted benefit
Low	10%	$61.9 million
High	20%	$102.1 million
Original	1.9%	$29.4 million

Un-monetised benefits arising to consumers, businesses and Government, due to increased resilience

102. Stakeholder consultations highlighted that resilience is a key issue for businesses currently, and an increase in resilience as a result of the new submarine cable will result in additional confidence in future resilience that comes as a result from CIG's visible willingness to take action. This can result in business expansion and an increase in inward investment, leading to increased economic activity. Business expansion is likely to occur as a result of two effects: new businesses, particularly those that require highly secure networks, will view Cayman Islands as an attractive place to invest in and existing businesses are likely to expand their activity due to increased confidence. Business expansion is most likely to occur for the 'information and communication' and 'financial and insurance services' industries. As outlined above, the total GDP of these sectors are $2.1billion, which is 38% of total economy. In a hypothetical scenario where an increase in business expansion results in a 5% increase in GVA for these sectors, this could translate to an increase in $106 million GVA. Note that this has been presented as an illustration only of the potential scale, and has not been included in the cost benefit analysis due to limited data availability on what the scale of business expansion would be.

103. Increased resilience can act as a key enabler of Government delivering crucial policy objectives, whereby digital technologies can be used to deliver and produce national services. Evidence has shown that this can deliver better outcomes for both the users of national services and those delivering the services, for instance, electronic medical records has had a positive effect on patient outcomes and clinicians' work lives. In Canada, 65% of physicians using electronic medical records that responded to the National Physician Survey indicated that patient care improved and less than 5% indicated a negative effect on the quality of care they provided[13].

104. Delivering Government services digitally, can create cost and time savings for Government officials due to more efficient processes in place, as well as increasing the Government's capacity to meet the demand for services by the population. It can also create better and more secure

[11] A discount rate [redacted] been assumed
[12] Source: economic modelling conducted for this OBC
[13] Do electronic medical records improve quality of care? - PMC (nih.gov)

processes for data collection, leading to an increase in the quality of data held by the government. This will strengthen the evidence base that the Government draws upon for policy decision-making, ensuring that any new interventions are effective in delivering the planned objectives. Improved data can also minimise the risk of unintended negative consequences of new interventions. There will be increased resilience in the event of any national or international crises occurring. The Covid-19 pandemic highlighted the importance of the need for strong resilience and reliability due to the increased reliance on connectivity across the globe.

105. The Government could also benefit from an increase in tax receipts, as a result of an increase in business and consumer activity. This benefit will be an economic transfer from businesses and consumers to the Government.

106. Since the pandemic, consumers across the globe place a much higher importance on broadband resilience and reliability and a new cable can provide more reassurance to consumers. Consumer research carried out by industry showed that 2,500 households in the UK and 35% of respondents found that the 'Covid-19 crisis has made consumers realise the value of a resilient and reliable connection over speed'.[14]

107. Local residents will experience knock-on benefits from any increased digitalisation of government services (discussed in paragraphs 100 and 101). The quality of services delivered will improve, leading to better end-user outcomes. There will be increased scope for local residents to access the services at a faster pace, and also interactions with Government service providers will be less costly due to potential for online channels of communications, such as live web chats, instead of face to face or via the phone.

108. There will also be new job opportunities, through inward migration as well as for local residents due to the increase in business activity. In 2020, 3,659 (8.8%) and 679 (1.6%) people were employed in the 'financial and insurance activities' and 'information and communication' industries respectively. As 2,279 people were unemployed in the Cayman Islands, of which 18.2% have attained an educational level equivalent to college/university[15], this shows that there is potential for these skilled people in unemployment to be placed in job positions.

[14] Broadband quality and resilience: a key consumer concern during COVID-19 | EY UK
[15] Labour Force Survey Report, Economics and Statistics Office

Economic appraisal against counterfactual scenario 2 – replacement of the MAYA-1 cable by a private sector provider

109. Qualitative analysis has been carried out to understand how the impacts will change in an amended 'do nothing' scenario:

- MAYA-1 becomes economically life-expired in [redacted]
- CJFS continues potentially indefinitely
- There is investment in a new cable to replace MAYA-1 **by a private provider**

110. In this scenario, if the CIG were to intervene and build a cable, there may be no additional, direct resilience benefits (as monetised above), as the new cable built by the private market would provide increased resilience anyway. However, it is noted that some of the un-monetised benefits arising from market / investor confidence in light of CIG's commitment to intervene could still arise.

Benefits to businesses, consumers and ISPs from a decrease in prices

111. Under this 'do nothing' scenario, there are likely to be **pricing benefits to ISPs and potentially end-users**. The end-users may be consumers who are purchasing services for residential use or may also be businesses who are using telecommunications services to provide a good or service.

112. Given that CIG is able to build the cable at a lower cost of capital than a private provider, and assuming that it charges at a price point based on recovery of costs, it has the scope to be able to provide services at a lower price point than a hypothetical new private provider who faces higher costs of capital (including a commercial imperative to make a financial return). **This will translate to a pricing benefit for ISPs at the wholesale level and if these lower prices are passed onto consumers, it will translate as a positive benefit to consumers.** The scale of benefit to consumers will depend on how much of the lower wholesale price is passed on by the ISPs. In the instance that the ISPs do not pass on any of the lower costs to consumers, this will still be treated as a positive economic benefit to ISPs.

113. The scale of this benefit to ISPs and end-users (cost to private sector providers) will depend on the price-setting mechanism of the hypothetical private provider.

- If the hypothetical private provider sets prices based on recovery of costs and its average cost of capital (including a normal, market rate of return), the scale of the benefit will be reflected by the difference in that cost of capital between the private provider and CIG.
- If the hypothetical private provider chooses to take advantage of its dominant market position and charges prices at a higher level, the scale of the benefit to ISPs and end-users from CIG's intervention in building a cable could be higher still.[16]

114. Dominant or monopoly market positions are typically associated with risks that include end-users being locked into overpriced services, which are not of sufficient quality. Consultations with stakeholders have indicated general difficulties when dealing with a dominant provider, particularly the time and effort spent to negotiate contracts in the absence of published prices and on terms that are not always convenient. Research shows that in the US, insufficient competition among broadband providers has resulted in there being access issues to affordable broadband services by end-users [17]. It is important to note that this research is comparable to the telecommunications market within the Cayman Islands as opposed to the subsea cable international market. However, it can indicate that in the scenario where there is a dominant provider, the capacity for consumers and businesses to react to higher prices is undermined,

[16] Note that the benefits to ISPs and end-users can be seen as a disbenefit to the hypothetical private provider. The foregone costs of the private provider could technically be spent elsewhere, either within the Cayman Islands or outside of the jurisdiction. Given that this appraisal is exploring the impacts of the Government intervention in a new cable, the choices that the private provider makes with its foregone costs is considered outside of the scope of this appraisal.

[17] Jonathan Sallet, Broadband for America's Future: A Vision for the 2020s, Benton Institute for Broadband & Society (Oct. 2019) [hereinafter "Broadband for America's Future Report"] and Mara Faccio & Luigi Zingales, Political Determinants of Competition in the Mobile Telecommunication Industry,

whereas where there is competition, if consumers perceive that they were being charged higher prices by their provider, they would be able to swap their services to a competitor. Intervention by CIG **would mitigate any risks of dominant market positions being established.**

115. Lower prices may enable an increase in business activity. For businesses, high speed connection can be key to carrying out general operations efficiently, such as the use of applications, cloud-based tools or transferring large files. A case study found in Brazil saw that the demand for broadband is elastic and that broadband services with higher speed have higher elasticities and are therefore more sensitive to price (up to 50 Mbps)[18]. Research undertaken on OECD countries also showed that 'broadband as a network technology has a measurable effect on economic output. Through information exchange, new services and telework has helped increase GDP by an average of 0.38% each year for the OECD countries'[19]. This indicates that CIG being able to offer lower prices could have the scope to facilitate business expansion, through two potential effects - new businesses seeing the Cayman Islands as an attractive place to invest in and the expansion of business activity for existing businesses. However, it is important to note that this depends on the extent that the subsea cable component feeds into final prices. Given that it is likely to be a small component of overall pricing, the final impacts may be limited.

116. In addition to this, lower prices and better services for consumers can also increase digital inclusion, and ensure that a higher proportion of local residents, particularly young people, have access to online services. Digital inclusion is key to access to education and achievement of educational outcomes of young people. In 2020, 92% of households in the Cayman Islands had internet connectivity, of which 73% had access to computer and/or laptops.[20] Despite the majority of households having access to the internet, it is still important to consider the barriers that the remaining 8% of households may have to online access. 'Technology inequity' was identified as one of the barriers to implementing virtual learning programmes in the Cayman Islands. The importance of digital inclusion has been amplified, particularly since the Covid-19 pandemic. It was identified that inequalities in access to computers at home, with reliable internet, was 'the biggest challenge in transitioning to virtual learning when schools were closed due to COVID concerns in mid-March'.[21] Lower prices can make internet services more affordable for lower income groups in Cayman Islands.

[18] https://www.scielo.br/j/rec/a/ZHxycLZCZZgspkdVhVGQPfr/?lang=en&format=pdf
[19] The economic impact of broadband: evidence from OECD countries (ofcom.org.uk)
[20] Economics and Statistics Office, Labour Force Report
[21] Closing Cayman's 'digital divide': Partnership provides students with computers, internet | Cayman Current

E. Economic Appraisal Summary

Counterfactual scenario 1– no replacement of the MAYA-1 cable

117. The tables below present a summary of the results for all options against the counterfactual scenario where it is assumed that there is no private sector provider replacing MAYA-1. It can be seen that both options will deliver value for money as they have a positive net present value. The [redacted] option delivers a NPV of [redacted] with a BCR of [redacted] and the Illustrative Spur option delivers a NPV of [redacted] with a BCR of [redacted].

118. There are, however, advantages of the self-build [redacted] option that are not realised by the spur options, although these benefits have not been monetised. They are:

- Certainty of delivery, where there is a higher degree of certainty about the deliverability of a self-build option than any specific third-party spur option
- Greater capacity on a self-build option, which is assumed to have multiple fibre pairs rather than a single fibre pair, and could therefore better support the concept of Cayman as a 'hub'.

Table 12: calculation of benefit cost ratio[22]

USD ($m)	[redacted]
Present value of benefits/disbenefits (PVB)	
Resilience	
Users / private providers paying for telecommunications services	
Total PVB	
Present value of costs (PVC)	
Capex and Opex	
Revenue	
Total PVC	
Net Present Value (NPV = PVB - PVC)	
Benefit Cost Ratio (BCR = PVB / PVC)	

119. It is important to note that the NPV and BCR values presented are an underestimate as the analysis does not capture the significant non-monetised impacts that are unlocked as a result of improved resilience. This includes an increase in business activity and job opportunities to residents as well as enabling Government public services to be delivered digitally which creates efficiencies as well as better outcomes for residents.

Counterfactual scenario 2 – replacement of the MAYA-1 cable by a private provider

120. In the counterfactual scenario where a private sector provider intervenes, there are no monetised resilience benefits as the private sector provider would have provided the solution anyway. There will be knock-on impacts that result from lower prices being offered by CIG than a hypothetical private provider. Any risk of a potential dominant provider charging higher prices will also be avoided. This is reflected in increases in welfare to ISPs and end-users (both businesses and consumers) through a reduction in prices, which could then translate to an increase in consumer and business economic activity. Due to the avoidance of a potential dominant private provider,

[22] Source: economic modelling conducted for this OBC on basis of infrastructure costs estimated by Pioneer Consulting

there could also be an increase in the quality of the general user experience, such as a reduction in time spent when negotiating telecommunications services and convenience of terms.

121. The table below presents the 'base level' NPV of both options without the impacts of improved prices and customer focus to ISPs and end-users. It shows that the un-monetised impacts from pricing and improved customer focus for the [redacted] option has to be of a greater scale compared to the Illustrative Spur option to reach a position where the investment is value for money (positive NPV).

Table 13: Calculation of Net Present Value[23]

USD ($m)	[redacted]
Present value of benefits/disbenefits (PVB)	
Present value of benefits (PVB)	
Present value of costs (PVC)	
Capex and Opex	
Revenue	
Total PVC	
Net Present Value (PVB - PVC)	

[23] Source: economic modelling conducted for this OBC on basis of infrastructure costs estimated by Pioneer Consulting

F. Sensitivity analysis

Costs

122. Sensitivity analysis has been carried out to calculate the percentage increase in total capex and opex costs for the NPV (against counterfactual scenario 1) to drop to a negative value. The costs for the [redacted] option would only have to increase by [redacted] which presents some risk, whereas the costs for the Illustrative Spur option would have to increase by [redacted] which seems considerably less likely.

Including the link to Cayman Brac

123. Further sensitivity analysis has been carried out to see the changes in costs and benefits as a result of **including the link to Cayman Brac.** The table below presents the increased discounted costs and benefits. The resilience benefits have increased by a small proportion to [redacted] due to there only being a small proportion of residents on Cayman Brac (3%). The figures show that both options deliver value for money within the monetised costs and benefits. The [redacted] option has a NPV of [redacted] and a BCR [redacted]. The Illustrative Spur option achieves high value for money with a BCR of [redacted] and a NPV [redacted]. In conducting this appraisal, the assumed revenue to the government-owned project (and hence costs to users) are assumed to be higher than in the appraisal of options without a link to Cayman Brac (in line with the Financial Case) but is still assumed to be constant between the two options for comparability. It can be seen that similar value for money conclusions can still be drawn as for the options without the link to Cayman Brac. It may therefore be favourable to do include the link to Cayman Brac in planned infrastructure to ensure digital inclusion for all residents on the sister islands, particularly with the unlocking of benefits such as educational inclusion for young people.

Table 14: calculation of benefit cost ratio, including link to Cayman Brac[24]

USD ($m)	[redacted]
Present value of benefits/disbenefits (PVB)	
Resilience	
Consumers paying for telecommunications services	
Total PVB	
Present value of costs (PVC)	
Capex and Opex	
Revenue	
Total PVC	
Net Present Value (PVB - PVC)	
Benefit Cost Ratio	

Varying assumptions around the decommissioning of MAYA-1

124. Further sensitivity has been carried out to explore the impacts if MAYA-1 is decommissioned after [redacted], instead of [redacted]. This builds on the options including a link to Cayman Brac presented in the previous section. The resilience benefits will drop from [redacted] to [redacted]. This results in the BCR for the [redacted] option dropping [redacted] and the BCR of the Illustrative Spur option dropping from [redacted] the negative BCR indicates that the disbenefits are higher than the benefits).

[24] Source: economic modelling conducted for this OBC on basis of infrastructure costs estimated by Pioneer Consulting

[redacted]

Varying assumptions around the decommissioning of CJFS

125. There is a risk that CIG intervention may result in a change in incentives of the current private provider, and therefore decommissioning of CJFS early than otherwise anticipated.

126. Under counterfactual scenario 1, in the instance that CIG intervention results in early decommissioning of CJFS, this could result in a period of time where there is only one cable and the resilience benefits are not therefore unlocked for this period. We have carried out a sensitivity test to explore how the NPV and BCR values change in this scenario. For illustration this sensitivity test is based on the options without a link to Cayman Brac.

127. For this purpose, we have used an illustrative assumption that an early decommissioning of CJFS takes place in year 2 after CIG builds the new cable, and that it takes 3 years to build a new cable, during which no resilience benefits are unlocked. The table below shows that there is a drop in BCRs for both options. [redacted]

[redacted]

128. Under counterfactual scenario 2, as above, there may be a period of time where there is only one cable due to early decommissioning of CJFS, and therefore a resilience disbenefit will occur compared to the 'do nothing'. Although such a disbenefit would further reduce the benefit to cost ratios assessed against this second counterfactual scenario (placing a greater reliance on non-monetised benefits in making the case for intervention – or on the case for acting to guard against the possibility of counterfactual 1) this would only be the case if that disbenefit could only arise as a result of the CIG intervention. In practice it is possible that a similar situation might arise as a result of a private sector intervention by a party other than the existing incumbent.

129. CIG may decide to intervene and build two cables upfront to mitigate the risk of CJFS being decommissioned early. In this instance, there will be increased costs, but the same level of resilience benefits will be maintained as under the options where CIG builds one cable. For illustration purposes, we have carried out analysis to present the 'worst case' scenario to CIG if it built two cables and CJFS continued to operate. The costs have been calculated for the higher cost scenario where cables have been built using Illustrative Spur and [redacted] options. Table 17 shows the breakdown of discounted costs for building two cables and Table 18 shows that this results in a negative NPV of [redacted] and a BCR [redacted] – which demonstrates poor value for money.

[25] Source: economic modelling conducted for this OBC on basis of infrastructure costs estimated by Pioneer Consulting

[26] Source: economic modelling conducted for this OBC on basis of infrastructure costs estimated by Pioneer Consulting

This position may be improved if CIG attains revenue benefits from the second cable, for instance, if the CJFS provider does exit the market, CIG would attain full market share of the second cable. The market share and revenue will be dependent on what the CJFS provider decides to do and how CIG is able to compete with the CJFS provider. The financial case models a number of scenarios on how different market share positions may result in different additional revenue benefits to CIG.

[27] Source: economic modelling conducted for this OBC on basis of infrastructure costs estimated by Pioneer Consulting

[28] Source: economic modelling conducted for this OBC on basis of infrastructure costs estimated by Pioneer Consulting

G. Conclusion

Assessment of options against Critical Success Factors

130. [redacted]

[redacted]

Table 19: advantages and disadvantages of simultaneous construction of two cables

Simultaneous construction of two cables	
Advantages	**Disadvantages**
• [redacted] • CJFS is already 25 years old, and may need replacing within the medium term • Allows CIG to benefit from the broad range of regional private sector cable systems that are currently being proposed, which may not be available in the future	• Increases costs (the extent depends on the options chosen), and may be effectively redundant in the interim if CJFS continues to operate • Sequencing the build of a second cable allows Cable Co to learn from the experience of the first cable and potentially benefit from any efficiencies identified • Sequencing the build of a second cable requires less organisational capacity in Cable Co • Provides a window of time for the private sector to build a cable to lever the Cayman Islands' new connectivity to the US, potentially allowing the Cayman Islands to act as a regional hub.

132. Considered as individual options, the self-build [redacted] option provides the highest level of confidence to CIG that continuity of connectivity can be achieved. This is because:

- a [redacted] option (which was brought forward from the Strategic Case) relies on securing onward connectivity on a third-party cable from [redacted]. Existing systems that could provide this are likely to be decommissioned before the life of a new cable expires; and at this stage there is no certainty that any new system that could provide this onward connectivity will be delivered, and it is therefore not clear that it is a viable option.
- there is no absolute certainty of delivery with regard to any specific one of the spur options under consideration.

133. However, a provider-agnostic approach to spur options, under which negotiations with multiple potential providers are entered into simultaneously may provide CIG with a reasonable level of confidence of delivery of continued connectivity.

Economic appraisal

134. The economic appraisal starts from a point of accepting uncertainty as to the do-nothing scenario (the 'counterfactual') based on the Strategic Case (and further consideration of the future of existing infrastructure in the Management Case).

135. It is important to note that in an economic case, we would usually present a larger range of monetised benefits. Due to the novel nature of the project and lack of historical precedent, this results in limited data and evidence to draw upon and the current BCRs presented in this case are driven by the cost assumptions only, as opposed to variation in monetised benefits. Therefore, a bigger focus has to be on the non-monetised benefits.

First counterfactual scenario — no new private sector provider enters the market

136. The analysis presents that in the counterfactual scenario where there is no private provider replacing MAYA-1, both the [redacted] and Illustrative Spur options achieve monetised value for money with BCRs of [redacted] respectively – this shows that economic benefits outweigh the economic costs to government for all options, although this excludes a wide range of benefits which it has not been possible objectively to monetise.

137. The figures suggest that the Illustrative Spur option has the highest value for money, with the self-build to [redacted] option delivering the lowest value for money. However, this does not take into account the certainty of connectivity under both options and is therefore, not on a risk-adjusted basis. The 'spur' options are dependent on there being a third-party provider being secured to deliver the project, and that delivery being made successfully. The preferred option should therefore be chosen by considering the findings from the economic analysis alongside the risks associated with the certainty of delivery for all options.

138. There are also several benefits to the Cayman Islands that have not been monetised in this appraisal. This includes an increase in business activity and job opportunities to residents as well as enabling Government public services to be delivered digitally which creates efficiencies as well as better outcomes for residents, and are therefore likely to improve the value for money assessments described above.

Alternative counterfactual scenario — a new private sector provider enters the market

139. In the alternative counterfactual scenario, where a private provider invests in replacing MAYA-1, CIG intervention would lead to be positive benefits associated with lower prices to ISPs and end-users, the expansion of economic activity as a result of lower prices, as well as better quality of services provided due to avoiding the risk of a hypothetical dominant provider. These impacts have not been monetised at Outline Business Case stage due to limited data availability. However, the analysis shows that the Illustrative Spur option is likely to achieve value for money as it requires a relatively small amount of pricing benefits [redacted] to achieve a positive NPV. There is increased uncertainty for the [redacted] option to achieve value for money due to requiring a higher scale of pricing impacts [redacted] to achieve a positive NPV.

140. A 'worst case' scenario could arise where, in this alternative counterfactual scenario, the hypothetical private provider decides to intervene anyway, despite the Government offering services at a lower price than what the private provider is able to charge. In this scenario, the private provider would lose out on costs as well as revenues, which would be abstracted by the Government, due to ISPs and end-users choosing the provider who is able to offer a lower price.

141. In order to avoid or mitigate the effects of this possible 'worst case' scenario, it is recommended that the Government is transparent and open to the public on what its position is and how it plans to intervene, so that the private market is aware and is able to respond as it best sees fit. It may be highly contentious for the Government to intervene and effectively prevent the private market from being able to provide services. However, the Government may still decide to do so due to not having confidence that the private market would provide adequate resilience to the economy (counterfactual scenario 1) or, in the event that the private market does provide adequate resilience (counterfactual scenario 2), there may be a risk of a hypothetical position of dominance which would result in higher potential prices and reduced quality of services to ISPs and end-users.

142. The economic case for pursuing a self-build to [redacted] option is less strong than that for a more affordable ‘spur’ option, and it has not been possible to monetise sufficient of its potential benefits to conclude unequivocally that it would be net beneficial. Such a conclusion can only be drawn by also considering the wider, non-monetised benefits as part of value for money, in the round (as should be done for any option). As set out elsewhere in this OBC, however (and the Management Case in particular), there are greater risks to delivery of a spur option, which should also be taken into account.

143. Overall, there appears to be a strong case for CIG to intervene by developing a project in one of these two ways, taking a view on the appropriate balance between potential net benefits and certainty of delivery.

Commercial Case

Commercial Case: table of contents

A. Introduction

1. This is the Commercial Case of the Outline Business Case (OBC) for the Cayman Islands Government's (CIG's) submarine cable project. It is the third of the five cases that form the OBC, and should be considered in conjunction with the other four cases: strategic, economic, financial, and management.
2. The Strategic Case of this OBC considers a long list of eighteen conceptual options to deliver new digital connectivity to the Cayman Island and shortlists these to eight options. For the purpose of this Economic Case (and carried forward into the Commercial and Financial Cases, these are grouped and structured as:
    - Self Build to [redacted]
    - Self-Build to [redacted] and
    - 'Spur' options using [redacted].

    (each with and without the option for a new link between Grand Cayman and Cayman Brac.)
3. This Commercial Case is structured as follows:
    - Following this introduction, **Section B** introduces the Commercial Case, describes how it fits into the broader context of this Outline Business Case, and explains its links to the other four cases.
    - **Section C** provides an explanation of the relevant roles and responsibilities in the project, as context for the subsequent discussion in Section D.
    - **Section D** considers the longlist of approaches that could be used to secure delivery of a new subsea cable system.
    - **Section E** discusses the commercial risks in delivery of a new subsea cable system.
    - **Section F** discusses the approach to procurement of new subsea cable infrastructure, by CIG or public sector entity.
    - **Section G** concludes the commercial case.

B. Role of the Commercial Case

4. The role of the Commercial Case is to assess the options of how the project could be delivered and to shortlist a delivery structure which can demonstrate that the project will result in a viable procurement, and a well-structured deal between the CIG and its service providers or private sector partners.

Commercial Case at SOC stage

5. At SOC stage, some initial calculations were undertaken to assess the commercial viability of a new cable system, including through estimating the pricing of capacity necessary on a new cable to service debt and fund operational and maintenance costs. Procurement strategy was also addressed, with two processes — a competitive process, and a direct award process — described as set out under the Procurement Regulations 2018. A high-level allocation of project risk was also set out.

Work undertaken at OBC

6. The work performed as part of the OBC has included the following:
    - Generation of a long list of commercial options which could be used to develop the project;
    - Assessment of the long list on a qualitative basis against the CIG objectives to provide a shortlist of options to be considered within the financial case; and
    - Outline of the approach to procurement under the recommended commercial structure.

C. Context

7. This section provides a brief overview of the commercial roles with relation to subsea cables in order to support understanding of the commercial discussion that follows. More detail is provided in the Management Case of this OBC.

Roles in delivery of new subsea connectivity

8. In order to develop the SOC's analysis further for the Strategic Case of the OBC, the project team has considered the different roles that would need to be established in order to deliver new subsea connectivity.

- **Ownership**

  The owner typically commissions a cable builder to construct a cable on a specified route. This entity is usually also responsible for financing the cable, and for ensuring its continued operation and maintenance.

- **Build**

  There are only a limited number of firms that can physically install a new cable, given the significant complex infrastructure such as cabling ships required to do so. Whichever of the wide range of possible commercial approaches is taken to the commissioning and financing of a new cable, it is likely that the actual deployment of the cable will be undertaken by a specialist firm that owns the appropriate ships and other infrastructure necessary to install a cable. Such firms typically provide a 'turnkey' solution, though do not typically take responsibility for ensuring that the necessary permitting and licencing for the cable is in place.

  There are several firms that could deliver a system in this way. Examples of firms that could do so include Alcatel Submarine Networks[1] (which is part of Nokia), US-based SubCom[2], the Japanese firm NEC[3], and Xtera[4] (which has a particular focus on the Caribbean).

- **Delivery of marine repair and maintenance**

  The principal approach to the repair and maintenance of subsea cables is through a dedicated maintenance provider. There are different approaches, but all require access to cabling ships so that the cables on the seabed can be accessed.

  A common approach to marine maintenance in the Caribbean is through membership of the Atlantic Cable Maintenance and Repair Agreement (ACMA), which is a non-profit cooperative cable maintenance agreement that acts in the interests of its members.

- **Landing Party**

  A landing party is required in each jurisdiction that a subsea cable lands. It is responsible for ensuring that appropriate permits and licences are obtained, renewed and complied with, and (typically) for ensuring that the Cable Landing Station (CLS) is maintained and operated effectively.

  A distinction can be drawn between 'operations and maintenance' landing parties, which manage a cable but does not control access and pricing, and a 'commercial entity' landing party, which controls access to and pricing of the cable's capacity.

- **Operation and Commercialisation**

  The capacity that a cable provides is typically sold to downstream providers. Typically, this capacity is sold in 'blocks' of e.g.10Gbps, on a per-month basis (but committed to for longer, fixed periods), of which the purchaser can use as much or as little as they wish. The term Monthly Recurring Charge (MRC) is used to describe these prices. The period over which

[1] https://web.asn.com/
[2] https://www.subcom.com/
[3] https://www.nec.com/
[4] https://www.xtera.com/

these contracts can be in place vary from months to years, and depend on the details of the commercial agreement between parties.

9. As there are industry-standard approaches to the building and the repair and maintenance of subsea cables, the principal question that needs to be resolved in developing the Commercial and Financial Cases of this OBC are those regarding firstly the **ownership** of any new cable and secondly the **cable landing party**.

Infrastructure options

10. The Economic Case of this OBC identifies two distinct types of approach to delivery of new subsea infrastructure:

    - **Self build**, under which CIG commissions (or causes to be commissioned) a new subsea cable, and then sells capacity on it. This approach is used for the options entailing direct connections to [redacted] and [redacted] from the Cayman Islands. However the Economic Case rules out options for self-build cables to other locations in the region such as [redacted] on the basis that these would better be pursued as spur options with new cable developers than building a speculative link to another jurisdiction independently. Therefore this commercial Case assumes that self-build options would only be to [redacted]
    - **'Spur' options**, under which CIG causes to be procured from a third-party cable provider a branch onto a separate cable, and acquires a right of use asset on the cable on which it is able to re-sell the available capacity. This approach is relevant for all of the third-party options discussed in the Strategic and Economic Cases of this OBC. The nature of an optimal deal with a cable developer for providing a spur could be quite bespoke to each situation to ensure the best infrastructure solution, factor in any advantages to the cable developer of providing the spur and potentially involve third parties who's proposals may have synergy with infrastructure to support the Cayman Islands.

11. The requirements and nature of these two types of infrastructure options with regard to the identification of parties to perform the roles listed above varies, as shown in Table 1 below. As indicated in Table 1, in any event where CIG is involved in causing the construction of a new cable it would do so through a special purpose vehicle (SPV), regardless of whether this is to be owned wholly or in conjunction with private sector partners.

Table 1: roles and responsibilities vary between types of infrastructure options

	Self-build options	3rd party spur options
Owner	The SPV would own the cable and associated physical infrastructure.	The SPV would own a right-of-use asset on a third-party cable, which it would be responsible for selling.
Build	SPV procures and manages build.	Cable owner procures and manages build.
Marine repair and maintenance	SPV responsible for procuring and managing maintenance agreements.	Cable owner responsible for procuring and managing maintenance agreements.
Landing party	SPV responsible for identifying both domestic and overseas landing parties. The SPV might choose to take the role of landing party at the domestic end, acting as a 'commercial entity'. Alternatively, a third-party 'O&M' landing party could be selected, but this is unlikely to be attractive because of the risk of abuse.	SPV responsible for identifying only domestic landing party (and may choose to perform this role itself). A third-party 'O&M' landing party could be selected, but this is unlikely to be attractive because of the risk of abuse.

	Self-build options	3rd party spur options
	It is likely that it would be preferable for the overseas landing party to be an 'O&M' landing party only, with the SPV maintaining commercial control.	
Commercialisation	SPV responsible for commercialisation and packaging and sale of capacity.	SPV responsible for commercialisation and packaging and sale of capacity.

D. Delivery Model Options

12. There are various ways in which CIG could discharge (or cause to be discharged) the responsibilities identified in the table above. Based on experience of infrastructure delivery elsewhere in this and other sectors, the broad commercial structures available are as follows:

- **Cayman Islands Government owned company**

  CIG establishes an arms-length, wholly owned company to plan, commission and operate the relevant infrastructure. The company would procure design, construction, ongoing maintenance and potentially some operational services from sub-contractors.

  For spur options, the company would seek to procure a right-of-use asset from a third-party cable in line with a mandate from CIG.

  As described in the Financial Case of this OBC, the company could be funded by general taxation and government borrowing, or by private borrowing against the project's revenue streams, or by a combination of the two.

- **Public Private Partnership**

  CIG or a wholly-owned CIG company lets a PPP contract to design, finance, build, operate and maintain the relevant infrastructure for a prescribed period (e.g. construction + 15 years) in return for a unitary charge. CIG takes ownership of the infrastructure after contract expiry and then makes alternative arrangements for onward O&M.

  It is not clear how this approach would operate in relation to a spur option as the third-party cable provider is already responsible for design, building, operating and maintaining a new cable.

- **Joint Venture**

  CIG establishes an arms-length company and invites parties to co-invest in it as a joint venture. Funding of the infrastructure and initial operations would be covered by equity investments and potentially a portion of commercial or government borrowing.

- **Consortium**

  Under a consortium model, CIG would be a partner and invest in a system with other partners. Each partner could then use the asset to service their requirements.

- **Usage or revenue guarantee**

  CIG incentivises private sector investment for either a new-build or a spur option through provision of minimum income / usage guarantees once cable is operational – giving private sector greater assurance and increasing viability.

- **Fully commercial procurement**

  No public sector intervention – assumes private sector will invest / deliver infrastructure improvements directly.

13. In all cases it is assumed that the role of cable landing party would be taken by the relevant SPV rather than being handed to a commercial third party, as this would provide that third party with control over aspects such as pricing, which would affect the ability to meet project objectives.

While an O&M-only landing party could be used in the Cayman Islands, it may be considered that this would introduce a risk of abuse of the cable.

14. Table 2 provides an assessment of this longlist of the potential commercial delivery model options. The table provides a description of each delivery option and how well it might address the key objectives of CIG. There may be other sub options of the delivery options included in Table 2 but these would be considered further in the financial case if relevant, and the objective of this commercial case is to generate a shortlist for financial consideration.

15. In Table 2, red (or ‘1’) indicates that an option performs poorly against an objective; green (or 3) that it performs well; and amber (or 2) indicates a mixed level of performance.

Table 2: longlisted delivery options

Commercial Delivery Options	Project Objective 1: To assure continuity and resilience of data connectivity for current and future needs, and to underpin inward investment.	Project Objective 2: To provide data capacity to meet background growth trends and support further economic growth in both existing and new sectors, notably the digital sector.	Project Objective 3: Ensure affordability, choice and innovation in the Cayman Islands' ICT market, to support digital inclusion and social/economic participation, as well as tourism.
Cayman Islands Government (CIG) owned company	2 CIG will have complete control and responsibility to build the relevant infrastructure over the required timescales and ensure this has resilience and meets future needs. The CIG can use this ownership to underpin inward investment and control this process. There is a risk that other market participants may challenge the involvement of a government-backed company (especially if the company is financed in a way that implies pricing subsidy), which could jeopardise implementation of the relevant infrastructure if not managed carefully.	3 Having complete control over the design and implementation of the relevant infrastructure, as well as any future upgrades, CIG will be able to ensure inter-island connectivity and provide adequate investment to meet expected future demand over the lifetime of the cable.	3 With access to relatively cheaper finance, a CIG-owned company may be able to present better value for money then through the other procurement options. This option also avoids risks associated with a dominant private sector provider, provided that a third party is not involved as a landing party.
Public Private Partnership (PPP)	1 The specification would be drafted for the PPP contractor to meet the objectives of the CIG. The contractor would be incentivised to meet the objectives or risk a deduction to their Unitary Charge. The lack of precedent for PPP contracts in the submarine cable market means that	2 The initial specification will be drafted by the CIG. Changes to this may be permitted under a change mechanism but have been problematic and expensive on other projects. PPP contractor unlikely to accept economic growth as a factor in their	1 Unlikely to present value for money due to the higher returns expected from the private sector in relation to both debt and equity (the typical capital structure used for PPPs) while some of the key risks of the project are unlikely to be transferable.

Commercial Delivery Options	Project Objective 1: To assure continuity and resilience of data connectivity for current and future needs, and to underpin inward investment.	Project Objective 2: To provide data capacity to meet background growth trends and support further economic growth in both existing and new sectors, notably the digital sector.	Project Objective 3: Ensure affordability, choice and innovation in the Cayman Islands' ICT market, to support digital inclusion and social/economic participation, as well as tourism.
	there may be little to no market interest, especially for the lower cost options. It would be difficult to hold a PPP contractor to account for underpinning inward investment. The risk of challenge or regulatory non-compliance in this option is similar to that for a CIG-owned company.	delivery as this will depend on other factors out of their control.	Limited market competition for a PPP contract would exacerbate this. A PPP operator is unlikely to be concerned about social inclusion unless this has a monetary benefit which would be paid for by CIG. A PPP will therefore likely fail to provide an affordable option for meeting objectives.
Joint Venture (JV)	2 CIG will retain some element of control to build the relevant infrastructure over the required timescales but may not have full control. However, a state-backed venture with a private partner will heighten the risk of challenge from other market participants. This could jeopardise implementation of the relevant infrastructure. Any requirement to underpin inward investment would be less relevant in a JV relationship where the JV partner is likely to require a commercial return.	2 CIG will maintain some control over the design and implementation of the relevant infrastructure. CIG will also be in a position to set out the investment requirements to ensure inter-island connectivity and future capacity demands are met. This overall control by CIG will be less than under the CIG owned company.	1 CIG will likely need to concede landing party rights to the private partner to secure the equity required. This greatly heightens the risk of monopolistic control by the private partner and so, as a procurement option, a joint venture is unlikely to provide value for money, nor support digital inclusion.

Commercial Delivery Options	Project Objective 1: To assure continuity and resilience of data connectivity for current and future needs, and to underpin inward investment.	Project Objective 2: To provide data capacity to meet background growth trends and support further economic growth in both existing and new sectors, notably the digital sector.	Project Objective 3: Ensure affordability, choice and innovation in the Cayman Islands' ICT market, to support digital inclusion and social/economic participation, as well as tourism.
Consortium	2 It is not clear that sufficient suitable consortium partners exist. CIG will retain some element of control to build the relevant infrastructure over the required timescales but may not have full control. However, a state-backed venture with a private partner will heighten the risk of challenge from other market participants. This could jeopardise implementation of the relevant infrastructure and lead to other consortium members being wary about entering into agreements with a government-owned company. Any requirement to underpin inward investment would be less relevant in a consortium relationship where the consortium partners are likely to require a commercial return.	2 As with a JV, CIG will maintain some control over the design and implementation of the relevant infrastructure. CIG will also be in a position to set out the investment requirements to ensure inter-island connectivity and future capacity demands are met. This overall control by CIG will be less than under the CIG owned company.	1 CIG would have limited control over the operations and maintenance strategy of the consortium, and hence the costs associated with it. However, CIG is likely to be able to maintain the role of landing party on the Cayman Islands.
Usage or Revenue Guarantee	2 This would involve a private sector partner which would have similar drawbacks to the JV proposition but may also provide for a lower ability of CIG to manage the connectivity and underpin inward investment.	2 This would involve a private sector partner which would have similar drawbacks to the JV proposition. Any future investment would need to be covered by further increases to the guarantee and CIG would	1 Likely to require giving up control on pricing to incentivise private sector investment. This heightens the risk of monopolistic control. If the guarantee is sufficient to incentivise the provider to promote digital inclusion

Commercial Delivery Options	Project Objective 1: To assure continuity and resilience of data connectivity for current and future needs, and to underpin inward investment.	Project Objective 2: To provide data capacity to meet background growth trends and support further economic growth in both existing and new sectors, notably the digital sector.	Project Objective 3: Ensure affordability, choice and innovation in the Cayman Islands' ICT market, to support digital inclusion and social/economic participation, as well as tourism.
	In terms of continuity, it may prove difficult to attract the right amount of equity to meet the timescales required without the use of subsidies. This in turn heightens the risk of litigation and regulatory non-compliance, which could jeopardise implementation of the relevant infrastructure.	not have as much control to meet changes and support economic growth.	and social / economic participation the CIG will pay for this and the provider will price in a risk premium for meeting such targets. Unlikely to provide an affordable option for meeting objectives.
Fully Commercial	1 The private sector would be interested in fulfilling its contractual obligations and making a commercial return. They are unlikely to be involved in underpinning inward investment. Unlikely that the private sector will invest without significant incentives/ guarantees from CIG.	1 Private sector would need to demonstrate that any further invest would be covered by additional revenues and would be concerned about competition issues from other parties. Private sector would be focused on their return and would not directly be focused on economic growth.	1 Will require significant incentivisation. Will not mitigate the risk of monopoly control - private sector would expect control over pricing The result will likely prove less affordable to consumers and could restrict future choice and innovation.

16. Table 2 highlights that in assessing the delivery structures against the agreed objectives of the CIG, all options with the exception of the CIG owned company have been classed as red against at least one of CIG's core objectives. The main issue with any private sector party being involved is that they will be primarily focused on the ensuring they can generate a commercial return for their shareholders, and this may involve them requiring to control pricing or for them to hold a dominant position in providing infrastructure to the CIG.

17. A PPP structure appears too rigid and fixed to promote the objectives of CIG which requires the potential delivery structure to remain flexible to future needs and growth, provide support for economic growth, support digital inclusion and social / economic inclusion and remain affordable. The social objectives are difficult to include in a PPP style contract and any private sector party would want to ensure they have significant risk allowance to cover these objectives as well as having clearly identified targets for these measures which will not be solely influenced the provision of the proposed cable. As an example, economic growth is directly related to other factors which the government is able to control such as tax policy, interest rates and other incentivise typically offered by governmental organisation. The final issue with the PPP structure is that it will be expensive as the private sector will require to put both debt and equity at risk to deliver the project over a time period of around 28 years and therefore the returns required for this are likely to be significantly higher than a 100% debt structure. Typical equity returns can range from 10%-15% for subordinated debt and in excess of 25% for pure equity. There is a lack of precedent for PPP contracts to deliver submarine cables. This means there may be very limited market interest which could mean the structure is undeliverable or attracts a very high cost of capital. Overall, this structure is unlikely to be affordable and might even be undeliverable. It is not therefore considered further in the financial analysis.

18. JVs are typically used where the private sector investor has some specialist knowledge or experience which the public authority does not have and a JV is formed to harness this while retaining some focus on the societal benefits outlined in CIG's objectives. As part of a JV structure, however, private sector capital would also be used and, as noted above, this would significantly increase the costs. This would either detract from project affordability or mean that the JV partner would likely wish to have more control over pricing or act as the landing party to improve its competitive position over the long term, which would not be reconcilable with CIG's objectives and potentially attract legal challenge around CIG facilitating this. Where the CIG wishes to retain control so that the system can be entirely open access, non-discriminatory and be priced to promote affordable connectivity on the islands, potential JV partners may find that acting as an anchor customer is more attractive than placing equity at risk in a JV. Another concept for a JV would be for CIG to buy into an existing, wider cable development enterprise. However, this may present a range of issues to the CIG in terms of governance and approvals for the investment and it is not clear that this would necessarily expedite or de-risk delivery of the wider project or otherwise support the objectives set for this project.

19. As an exception to the above conclusions, a JV (or potentially an investment consortium approach) might be suitable in the case where a private partner has a complementary interest in similar infrastructure to secure revenues from another jurisdiction. This should be considered if such a scenario presents itself in relation to an option for a spur from a third party cable.

20. Consortium models are similar to a JV, but one where the delivery entity does not generate revenue and the investors generate their revenues outside of the JV — in other words, they contribute to costs and a parent company or affiliate benefits form the usage to generate revenue as a telecommunications provider. The model therefore exhibits similar problems to a JV in terms of risk transfer and control.

21. A usage or revenue guarantee would be used where a private partner was responsible for delivering the infrastructure and services but there was (or there was a potential for) insufficient demand to allow the private partner to repay their debts or make a commercial return. In this case CIG would provide a revenue guarantee to ensure the funders were fully paid and the private sector party made an acceptable return. This would have the same issues noted above for the social objectives and would also be more costly given the requirement to secure private capital. It may also present risks of legal challenge depending on how it is procured.

22. A fully commercial solution has not yet occurred and there are doubts as to whether this would be viable in the short term, leaving the risk of discontinued connectivity or resilience. In the medium term an entirely commercial solution remains possible but would risk establishing a new dominant provider in the long term.
23. Therefore the only feasible solution which achieves the objectives of the CIG is to take the project forward promptly under a CIG owned company with the CIG responsible for delivering a coordinated strategy against the societal benefits, ensuring the solution is affordable by securing lower cost government funding.
24. In the absence of engagement of a commercial partner, however, it will be of particular importance that Cable Co should seek to work actively in the market and engage regularly and effectively with market participants. It should conduct effective ongoing engagement with its target market in order to benefit maximally from industry expertise, optimise its commercial offer to customer needs, and explore the possibility of securing anchor customers for a new cable as early in the project as possible.
25. In the Financial Case, this option has therefore been assessed against a number of cable infrastructure options to illustrate the overall cashflows and net present value over the assessment period. As part of this assessment a number of funding structures have been assessed for the CIG-owned company to demonstrate their impact on affordability and cashflow. These funding options considered further in the financial case include:
    - Fully funded by CIG by way of loan finance which is paid back at the government's cost of borrowing;
    - The CIG provides grant funding for some or all of the capital upfront works which is not required to be paid back (but for any operational surpluses to be retained by CIG.
26. The management approach to establishing a CIG-owned company (known in this OBC as 'Cable Co') is set out in detail in the Management Case of this OBC.

E. Commercial Risks

27. Conceptually, one of the advantages for a government of working with a commercial third party to deliver infrastructure projects is the ability of the government contractually to transfer risk to the third party. Doing so can allow the government to benefit from more stable and forecastable cashflows over the life of the project, avoid unexpected short-term calls for additional funding, and allow it to benefit from the skills and technical expertise of a commercial partner who is incentivised to optimise a project's costs and revenues.
28. There are two broad categories of financial risk that can conceptually be transferred to a third party: cost and revenue. Typically, in a project setting, in order to secure value for money from a risk transfer, alongside the risk must be transferred to the third party some ability to control the drivers of that risk.
29. The drivers of the principal costs and revenues associated with subsea cables are set out in Table 3 below, along with an assessment of the extent of CIG's ability to transfer these risks to other parties through contracts.

Table 3: financial flows, drivers and ability to transfer risk

Area of risk	Principal drivers of risk	Ability to transfer risk in a value-for-money way?
Capital expenditure	Cost of cable components Cost of marine operations Cost of licensing and permitting Cost of staff	Yes, contracting these risks to a third party through procuring a fixed-price 'turnkey' solution is an industry standard approach.
Operational expenditure	Cost of staff Cost of marine maintenance of cable Cost of general administration, e.g. office accommodation	Yes, through a third-party landing party. Given the relatively low level of risk involved in operational expenditure, however, it is unlikely that transferring this risk away would be necessary.
Revenue	Level of demand for capacity Pricing	Given the uncertain nature of long-term demand for capacity on a new cable, it is unlikely to be possible to transfer revenue risk to a third-party without also transferring pricing control to the same party. Transferring pricing control to a third party is incompatible with deliver of CIG's project objectives which include ensuring affordability in the Cayman Islands' ICT market.

30. As Table 3 shows, transferring of risk associated with capital construction is an industry-standard approach, and can be secured through a fixed-price turn-key contract with a subsea cable provider selected through a procurement.

31. It appears unlikely to be possible for CIG to transfer revenue risk away from a Cable Co without also transferring control of pricing for access to subsea connectivity to the same party. This would be in tension with CIG's objectives, as the third party is likely to be incentivised to seek to maximise its profit (which may involve acting as a monopolist), rather than ensuring widespread open access to digital connectivity.

F. Approach to procurement

32. The legislation relevant for procurement of new subsea cable infrastructure by CIG or a public sector entity such as Cable Co is understood to be the Procurement Regulations, 2018[5], which operate within a framework established by the Procurement Law, 2016[6].

33. The regulations make provision for two types of procurement:

    - **Competitive process**

      Entities governed by the regulations are required by the regulations to undertake a competitive process when procuring any good, services or works, except where it can be demonstrated that the procurement meets the criteria for the direct award process.

[5] https://www.procure.gov.ky/upimages/commonfiles/12650500_1526373533.PDF
[6] https://www.procure.gov.ky/upimages/commonfiles/Es1512016_web_1548057985.pdf

- **Direct award**

  A direct award may be made in certain circumstances that are defined in the regulations. These include circumstances where the goods or services are not competitive products and are only available from a single supplier.

34. The type of procurement that would be required for a new subsea cable depends on the nature of the infrastructure sought. This is because many providers may be capable of constructing a stand-alone 'turnkey' new cable, while by definition a spur to a third-party cable can only be procured from the owner of that cable. The implications of this for the nature of the procurement are that:

    - A standalone **self-build cable** should be procured through a competitive process that appropriately balances price and quality to deliver outputs defined at a technical level by Cable Co to deliver CIG's high-level requirements.
    - A **spur** is likely to have to be procured for a direct award, as a competitive process where only one supplier is capable of delivering the requirements would be futile. However, in order to maximise the prospects of securing value for money from a direct, award, Cable Co could be empowered to negotiate potential deals for spurs with multiple possible providers simultaneously. This would allow multiple providers' prices to be compared, and an in-the-round assessment made of which option to pursue taking into account quality, price, and an assessment as to the likelihood of delivery, thereby introducing a level of competitive tension into the process. (Conversely, if negotiations were entered into with only one potential spur provider then benchmarking and a consequent value for money assessment would be infeasible.)

      Following Full Business Case approval, Cable Co could grant a direct award to the best opportunity identified.

35. The detailed management approach that Cable Co may take to pursue these procurements is explored in detail in the Management Case of this OBC.

G. Conclusion

36. This Commercial Case considers the structure that should be used by CIG to deliver new subsea digital connectivity. The analysis concludes that the only feasible solution that achieves the CIG's objectives is to take the project forward under a CIG-owned company ('Cable Co'), with that company (overseen by CIG) responsible for delivering a coordinated strategy against the benefits sought, and supporting the affordability of the solution by securing lower cost government funding.
37. Although involvement of third-party market participants in the ownership and direction of the Cable Co could be a source of capital and industry expertise, the criteria necessary for private sector participation in managing revenue are likely to be incompatible with CIG's project objectives.
38. In the absence of such participation, however, the Cable Co should seek to conduct effective ongoing engagement with its target market in order to benefit maximally from industry expertise, optimise its commercial offer to customer needs, and explore the possibility of securing anchor customers for a new cable as early in the project as possible.
39. With regard to cost, risk associated with capital construction is, in the industry's standard approach, transferred to a cable supplier through a fixed-price turnkey contract secured through a procurement.
40. It appears unlikely to be possible for CIG to transfer revenue risk away from a Cable Co without also transferring control of pricing for access to subsea connectivity to the same party. This would be in tension with CIG's objectives, as the third party is likely to be incentivised to seek to maximise its profit (which may involve acting as a monopolist), rather than ensuring widespread open access to digital connectivity. Moreover, the associated inherent uncertainty of revenue demand also limits the ability to transfer this risk from the outset.
41. The nature of procurement that Cable Co will undertake is discussed in Section F. There are broadly two types of infrastructure solution — self-build and spur options — and the type of procurement pursued will depend upon the preferred infrastructure option, with a competitive process being appropriate for a self-build option, and a direct award likely to be necessary for a spur option.
42. The approach that Cable Co could take to the funding and financing of the cable is considered in detail in the Financial Case of this OBC.
43. The approach that CIG could use to govern its relationship with Cable Co, and to hold it to account for successful delivery of the project, is explored in detail in the Management Case.

Financial Case

Financial Case: table of contents

The following Annex has also been provided as a separate document:

A. Introduction

1. This Financial Case is structured as follows:

   - Following this introduction, **Section B** introduces the Financial Case, describes how it fits into the broader context of this Outline Business Case, and explains its links to the other four cases.

   Then, with regard to the financial modelling that has been conducted,

   - **Section C** explains the assumptions that have been made in the financial model with regard to capital expenditure.
   - **Section D** explains the assumptions that have been made in the financial model with regard to operational and maintenance expenditure.
   - **Section E** explains the assumptions that have been made in the financial model with regard to demand and revenue.
   - **Section F** explains the approaches to financing the project that have been considered and identifies the approaches that have been modelled.
   - **Section G** sets out the key financial risks identified for the project.
   - **Section H** presents and explains the results of the financial analysis, including sensitivity testing around key financial risks.
   - **Section I** concludes the financial case.

   Four appendices are also provided:

   - Appendix 1 provides further detail on the assumptions made around capital costs
   - Appendix 2 provides further detail on the assumptions made around operating costs
   - Appendix 3 estimates the price a new private sector provider might charge were it to construct new infrastructure
   - Appendix 4 presents cashflow profiles derived from the financial model.

B. Role of the Financial Case

2. The role of the Financial Case is to evaluate alternative approaches to financing the project and to demonstrate its financial sustainability and affordability. In this context, the term ‘affordability’ relates to whether or not the capital and ongoing costs (net of revenues) are within the profile of funds available. The financial case assessment requires the capital, operational, financing and other whole life costs of the project, as well as associated revenue, to be analysed for the preferred options, in order to support decision-makers to assess the affordability of different options or combinations of options.

Financial Case at SOC

3. In the Strategic Outline Case prepared by CIG in 2021, a range of potential cost of new cables was presented[1]. The options considered were a Dedicated Cable, a Branching Unit or a Fibre Pair on an Existing Cable, and a Branching Unit and a Fibre Pair on a potential Future Cable. The costs were derived from a range of sources, including proposals received by CIG, and from an examination of similar projects funded by the World Bank and the Asian Development Bank. Details at a specific line-item basis on the capital and operational costs were not developed, although estimates were made of the principal components of each element of cost.
4. Three financing approaches were also identified in the SOC: equity, debt and government grant, which were assessed qualitatively. Financial risks and financial sustainability were also considered.

[1] Strategic Outline Case, page 30

Work undertaken at OBC

5. For the OBC a financial model has been built to assess the revenue that would need to be generated by selling capacity on a new cable, in order for the project to be financially viable under a variety of scenarios. In this context financially viable is assumed to be defined as ensuring that the cash balance at the end of the operational period is nil and that cashflow has serviced all debt requirements under the different scenarios tested.

6. The model operates by modelling project cashflows on a six-monthly basis over a twenty-eight year period. This period comprises an assumed three-year construction period, and a twenty-five year operating period. The model takes a range of assumptions as inputs (discussed in Sections C to E of this Financial Case), and allows the calculation of the revenue that would need to be generated from the market by selling bandwidth in order to recover the initial investment in various scenarios. Its outputs are expressed in units of $USD per per month per 10Gbps of assumed, existing equivalent market share. The model also allows the calculation of the grant that would be required in order to be able to deliver the required capacity to the market at specified price points per 10Gbps of assumed, existing equivalent market share.

7. The financial model has been used to assess different financial approaches and outcomes within the preferred commercial structure identified in the Commercial Case — namely, a CIG-owned company ('Cable Co') being responsible for the installation and subsequent sale of capacity on the new infrastructure. This is identified as the only option which is consistent with the CIG objectives.

8. Within this structure, the following infrastructure options have been assessed:

    - Self Build to [redacted]
    - Self-Build to [redacted]; and
    - 'Illustrative Spur' option, [redacted].

    (each with and without the option for a new link between Grand Cayman and Cayman Brac.)

9. Outputs of the financial model are set out and explained in Section H.

10. In addition, further analysis is included in Appendix 3, where the model has also been used to establish the minimum $ per 10 Gbps per month charge if a commercial operator was to install and finance new infrastructure, assuming this is funded from a shareholder loan at an indicative commercial rate.

C. Capital cost assumptions

11. This section sets out estimates of the capital costs ('capex') associated with each of the preferred options identified in the Economic and Commercial Cases of this OBC.

Approach to capital cost estimates

12. For each project modelled, the capital costs have been estimated by Pioneer Consulting. A detailed exercise has been undertaken to assess the individual costs and expected timings and these are noted below. Specific details of the costs reviewed are included in Appendix 1 of this Financial Case.

13. Indexation is applied at a rate [redacted]

Optimism bias

14. In additional to the capital costs, best practice in business case development requires the explicit adjustment for presumed optimism bias in cost estimates. This acts to address the demonstrated and systematic worldwide tendency for project appraisers to be optimistic.

15. In order to assess an appropriate level of optimism bias adjustment for CIG's submarine cable project, the following factors have been considered:

- the proposed project appears to represent a combination of a 'standard civil engineering project' and an 'equipment and development project' as defined in the Better Business Cases guidance[2]:
    - 'standard civil engineering' projects are those that involve the construction of facilities, in addition to buildings not requiring special design consideration
    - 'equipment and development' projects are concerned with the provision of equipment and/or development of software and systems (i.e. manufactured equipment, information and communication technology development projects or leading edge projects)
- no special design considerations have been identified — for example, there are no unusual space constraints or unusual output specifications such as exceptional length or complex seabed terrain. The project appears typical for the subsea cable industry.
- the cost estimates have been developed by industry experts Pioneer Consulting on the basis of significant recent market experience.

16. The Better Business Cases guidance developed by HM Treasury and the Welsh Government in the UK proposes a range of optimism bias adjustments that could be deployed in various areas. The relevant ranges are shown in Table 1 below.

Table 1: Better Business Cases recommended ranges of Optimism Bias for capital expenditure

Project type	Optimism bias (%) for capital expenditure	
	Upper	Lower
Standard civil engineering	44	3
Equipment/development	200	10

17. On the basis of the consideration above, an optimism bias adjustment of [redacted] has been added to all capital costs estimates developed by Pioneer Consulting, for both international links and the link from Grand Cayman to Cayman Brac. This represents a value towards the lower end of the recommended range for standard civil engineering, and at the low end of the recommended range for equipment/development. Relatively low values have been selected on the grounds that cable laying and installation is relatively simple and frequently undertaken engineering.

Capital cost estimates

18. On the basis of the approach described above, the estimated costs associated with the four projects identified in the Economic and Commercial Cases of this OBC are presented in Table 2 below. It should be noted that, while the estimates for the 'Illustrative Spur' option are, for illustration, based on an infrastructure option to connect with the TCFS system, these costs do not reflect any commercial offers or discussions with the developer of TCFS or other cable developers and have been established independently by Pioneer Consulting based on infrastructure scope and key technical parameters.
19. It should also be noted that two cost estimates are provided for infrastructure to provide connectivity to Cayman Brac. The first comprises the costs of adding a branching unit and a spur to Cayman Brac to a self-build cable. The second comprises the costs of a standalone link from Grand Cayman to Cayman Brac. It is assumed that where a link to Cayman Brac is built alongside a 'spur' option, the standalone costs are used.
20. In all cases, unless otherwise stated, costs are presented in US dollars and in 2022 prices. At the time of writing in August 2022, one US dollar is equal to 1.22 Caymanian Dollars.

[2] Guide to Developing the Project Business Case, 2018, HM Treasury and Welsh Government

Table 2: estimated capital costs of infrastructure options[3]

21. It is noted from Table 2 that the costs of a Grand Cayman to Cayman Brac link are estimated to be approximately [redacted] if the scheme is built as part of a larger project (rather than as a standalone system). This is because:
    - a longer additional cable would be required when the link is built as part of a wider system
    - a subsea branching unit is assumed to be required.
22. It can also be noted from Table 2 that a sum of [redacted] has been included in the costs of an illustrative spur project, which represents a contribution towards the capital costs of the 'trunk', onto which a spur cable is assumed to connect. This figure is uncertain, but has been estimated for the purposes of this business case on the following basis:
    - the length of the trunk for a cable has been estimated. In practice, this distance is likely to vary significantly. For purposes of costing, the 'trunk' has been assumed to be [redacted] long.
    - it is assumed that this trunk would cost [redacted] per km, resulting in a total assumed cost of the trunk of [redacted]
    - it is then assumed that the Cayman Islands would be asked to cover one-sixteenth of this cost, as it is assumed, for illustration, that the cable would contain sixteen fibre pairs, of which one would be dedicated to the Cayman Islands.

[3] Source: estimates by Pioneer Consulting for this OBC

Profile of capital costs

23. Payments to suppliers of subsea cables in respect of construction costs are typically made on delivery of various milestones throughout the project. Some of these milestones can be physical items — such as, for example, the completion of marine installation — while others can be delivery of regulatory or permitting requirements. This approach acts to incentivise the supplier to deliver the outputs sought by the client and makes it easier for the supplier to manage their cash-flow over the course of the project.

24. The precise timing and nature of milestone payments associated with each of the options will be the result of commercial negotiation with either the suppliers of a self-build system, or with the owners of a third-party cable to which a Cayman branch could be connected. As no commercial negotiations have been entered into at this stage in the project, assumptions on the phasing of payments have to be made for the purposes of financial modelling and this is outlined below.

3rd party milestones

25. Using evidence from recent industry projects, an illustrative breakdown of project milestones associated with a typical ‘branching’ project (under which a spur onto a third-party cable would be constructed with either a branching unit or a fibre pair) has also been created by Pioneer Consulting. These milestones have been assumed to occur at equal periods over a 24-month period, beginning at the coming into force of the contract and ending with provisional acceptance of the system.

26. An estimate of the proportion of total capital expenditure for a ‘branching’ project associated with each milestone has also been produced, again on the basis of recent industry intelligence.

27. These typical milestones and associated payments are shown in Table 3 Table 3below and illustrated in Figure 1.

Table 3: illustrative project milestones and associated payments from a typical 'spur' project[4]

No.	Item	[redacted]
1	Contract in Force	
2	Complete manufacture & cable ship mobilisation	
3	End of Marine installation	
4	Completion of terminal station equipment	
5	Provisional Acceptance	

[4] Source: illustration developed by Pioneer Consulting for this OBC

Figure 1: illustration of spur milestone payments

Self-build milestones

28. Pioneer Consulting have also created an illustrative breakdown of milestones that might be associated with a 'self-build' project such as a direct cable to [redacted] or [redacted] There are typically significantly more payment milestones associated with a self-build project than with a 'spur' project, although the precise nature of these milestones will depend on the contract negotiated with the supplier and may vary.

29. These milestones have been assumed to occur at equal periods over an assumed period beginning at the coming into force of the contract:

    - For the option of a [redacted] a distance of around [redacted].
    - For [redacted] is assumed.

30. An estimate of the proportion of total capital expenditure for a self-build project associated with each milestone has also been produced, again on the basis of recent industry intelligence.

31. These typical milestone and associated payments are shown in Table 4 below and illustrated in Figure 2. Given the detailed nature of the milestones, for visual clarity, the milestones have not been labelled in Figure 2 but are shown in Table 4: typical project milestones and associated payments from a typical self-build project.

Figure 2: illustration of self-build milestone payments

Table 4: typical project milestones and associated payments from a typical self-build project[5]

No.	Item	Milestone description	Assumed month	% of capex paid	Cumulative % of capex paid
1	Contract Agreement	Coming into Force	[redacted]		
2	Desk Top Study	Purchaser's approval of the desk top study final report			
3	Project Management	Project management plan and quality assurance specification approved by the purchasers			
4	Product Design	Product design approved by purchasers except for Open Cable Interface			
5	Route Survey	a) Purchaser's approval of Straight Line Diagram and Route Position Lists b) Provisional survey report submitted to the purchasers			
6	Route Survey	a) Incorporation of purchasers' comments into the Final Route Survey Report; b) Purchasers' receipt of the Final Route Survey Report			
7	Sea cable manufactured (including spares)	a) Cable Test Specification approved by the Purchasers in compliance with Technical Specification requirements b) Factory Release certified by the purchasers of cable spans corresponding to 25% of total cable length			
8	Sea cable manufactured (including spares)	Factory Release, certified by the purchasers of cable spans corresponding to 50% of the total cable length			
9	Sea cable manufactured (including spares)	Factory Release, certified by the purchasers of cable spans corresponding to 75% of the total cable length			

[5] Source: illustration developed by Pioneer Consulting for this OBC

No.	Item	Milestone description	Assumed month	% of capex paid	Cumulative % of capex paid
10	Sea cable manufactured (including spares)	Factory Release certified by the purchasers, of cable spans corresponding to 100% of total cable length	[redacted]		
11	Repeaters (including spares)	Repeater Test Specification approved by the Purchasers in compliance with Technical Specification requirements and Factory Release, certified by the purchasers of 50% of the total number of Repeaters			
12	Repeaters (including spares)	Factory Release certified by the purchasers of 100% of total number of Repeaters			
13	Branching Units (including spares)	BU Test Specification approved by the purchasers in compliance with Technical Specification Requirements and Factory Release, certified by the purchasers of 100% of BU's			
14	TSEs (including spares)	Factory Release certified by the purchasers, of 100% of Terminal Station Equipment			
15	In station test	In-station test completed			
16	System Assembly	Test completed			
17	Permitting	Obtain and procure all permits that the contractor is responsible for			
18	Marine and Land Cable Installation	a) Completion of 100% of land cable and shore-end installation in all landing stations; b) Coordination meetings on marine activities; c) Submission of detailed marine operations schedule; d) Marine Installation procedure submission; e) Submission of daily ship reports and as-built charts / documents needed for operational and maintenance purposes; f) Submission of provisional report to the purchasers			
19	Provisional Acceptance	Provisional Acceptance Certificate issued			
20	Deficiency List	All outstanding items cleared			

D. Estimations of operational and maintenance costs

32. This section sets out the estimates of the operational costs ('opex') associated with each of the preferred options identified in the Economic and Commercial Cases of this OBC

Operating cost estimation approaches

33. For each project modelled, the operating costs have been estimated by Pioneer Consulting.

34. The costs estimates have been assembled under five key headings as detailed in Appendix 2 of this Financial Case, and the operating costs used for each option are summarised below.

35. It is assumed that if a link from Grand Cayman to Cayman Brac were built as part of a larger system, significant operational efficiencies and economies of scale equal to 90% of the stand-alone operational expenditure estimates for a similar link could be made.

36. Indexation is applied at a rate of [redacted], although the current high-inflation global environment must be noted.

Estimates of costs for onward connectivity

37. In addition to the capital costs, digital connectivity that reaches only an overseas cable landing station is not in itself sufficient to provide connectivity onwards to the rest of the world. In order to provide a comprehensive estimate of the costs associated with a new subsea cable, assumptions therefore have to be made about the costs of onwards connectivity from the cable landing station.

38. In practice, an overseas landing party (which as described in Appendix 1 it is assumed that a new cable would use) is likely already have connections onwards from the landing station to a Network Access Point (NAP), and the costs associated with onwards transmission from the landing station to the NAP will typically be included in the overall commercial transaction conducted with the landing party. This means that the costs below are unlikely to be charged as stand-alone items, but would rather be reflected in the overall commercial deal reached with an overseas landing party. However they have been included here for completeness.

39. To ensure that a comprehensive estimate of cost can be provided, the following estimates of onwards connectivity costs have been made by Pioneer Consulting:

    - Connectivity from a cable landing station in [redacted] per month per 100G.

      This assumption is uncertain and could vary by around 50% depending on the commercial incentives faced by the landing party.

      (An alternative solution [redacted] would be to directly lease a dark fibre pair, which is anticipated to cost around [redacted] per month per km per fibre pair.)

      Both estimates above assume that the connection would be pre-agreed between the landing party and CIG as part of the Landing Party Agreement.

      In addition, there is likely to be a cross-connection charge that is charged by the NAP itself, to allow a new cable to make onwards connections within the NAP. This is assumed to cost [redacted] per month per 100G.

      This information is summarised in the table below.

Table 5: Calculation of connectivity cost[6]

Item	Costs USD per month
Connectivity from CLS to NAP	[redacted]
Cross-connection charge in NAP	
Assumed total	

- Connectivity from a cable landing station in [redacted], starting in 2024, is estimated to cost [redacted] per month for 10G and [redacted] per month for 100G.

  This cost would include onward connectivity from the third-party landing station in the USA to the NAP.

- Connectivity from a spur on a third-party cable [redacted] is assumed to carry an identical cost to what is assumed for the [redacted] option. In practice, these costs are likely to form part of the commercial deal between a third-party cable provider and CIG.

These costs have been incorporated into the financial model for each relevant option.

Optimism bias

40. In line with the approach taken to capital expenditure, an optimism bias adjustment of 10% has been made to all estimates of operational expenditure, which includes the private sector commercial option. At Full Business Case stage, this approach could be developed further through development of a quantified risk assessment (QRA).

[6] Source: estimates by Pioneer Consulting for this OBC

Operational cost estimates

41. On the basis of the approach described above, the estimated costs associated with the four projects identified in the Economic and Commercial Cases of this OBC are presented in Table 6 below.

Table 6: estimated operational expenditure[7]

[redacted]

[7] estimates developed by Pioneer Consulting for this OBC

E. Demand and revenue assumptions

42. The other key area for which assumptions have been made relates to the level of demand for digital connectivity from a new cable. The assumptions used are explained below.

- **Current, underlying demand**

  Current demand for the whole of the Cayman Islands has been estimated by Pioneer Consulting at [redacted] per second, as set out in the Strategic Case of this OBC.

- **Underlying demand growth rate**

  Demand is assumed to grow at [redacted] per year, in line with the estimate by Pioneer Consulting set out in the Strategic Case of this OBC.

- **Underlying Price growth rate**

  The real price growth rate is set to be [redacted] which in real terms balances the underlying demand growth rate, such that the growth in demand and the reduction in the price results in [redacted] real growth in revenue. In other words, it is assumed that the price paid for subsea capacity falls at the same rate that demand grows. In effect, this allows the model to work in terms of monthly revenue generation per 10Gbps of existing equivalent market share captured.

- **Indexation**

  Indexation is applied at [redacted] consistent with growth in capital costs and operating costs

- **Purchased:used bandwidth ratio**

  Discussions with stakeholders during the development of this OBC have demonstrated that ISPs routinely 'overbuy' the capacity they require. This is a known phenomenon – the purchased:used ratio, which can be benchmarked elsewhere as shown in the table below. The ratio reflects the tendency to overbuy bandwidth due to factors such as uncertainty about growth potential over the contract term, the lead-time for upgrade, granularity of bandwidth available for sale from the cable landing party and contract structures that potentially favour larger units of bandwidth or longer contract terms. In highly competitive markets this ratio approaches 1.0, whereas in less competitive markets this ratio can be [redacted]. For the Cayman Islands we have assumed a ratio of [redacted]

Table 7: Bandwidth to purchase ratio by geographical location[8]

Geographical Location	Purchased:Used Bandwidth Ratio
Trans-Atlantic	1.0
Trans-Pacific	1.1
US-Latam	1.3
Intra-Asia	1.1
Europe-Middle East	1.6
Europe-East Asia	1.6
Europe-South Asia	1.4
East Asia-South Asia	1.5
Europe-Sub Sahara Africa	1.5

[8] Source: Telegeography

- **Purchased redundancy**

  In more competitive markets for international connectivity, bandwidth may be priced and sold including redundancy provision (i.e. the ability to divert traffic via an alternative route or routes in the event of a cable outage). When considering the sale of linear capacity, it is also necessary to consider the degree to which redundancy is likely to be purchased. Achieving 'level one' resilience (i.e. the ability to withstand one cable cut) is assumed to be a minimum requirement for customers. Therefore we have assumed a redundancy purchasing ratio for linear bandwidth [redacted].

- **Market share prior to and after decommissioning of an existing cable**

  If a CIG-sponsored cable is to be delivered in time to avoid the Cayman Islands facing reliance on just one, existing cable (and the resilience risks that would accompany this) it must be assumed that the cable will face two phases of market share. Initially, the CIG cable would have to co-exist with both existing cables, competing for market share based on price and other relevant factors. If one of the existing cables is decommissioned then the CIG cable would be more critical for the resilience of the Cayman Islands' international connectivity, but also then enjoy a stronger market position. The assumptions used about the decommissioning of existing cables are important. In light of the analysis of the lifetime of existing infrastructure set out in the Management Case of this OBC, our central case assumption will be that an existing cable will be decommissioned [redacted] from now. However, as noted in that analysis, this is highly uncertain and the owners of the existing cable may make a different assessment and we have not entered any consultation with them on this assumption. We have considered the market share potential for these two phases in turn, below.

  Prior to one of the existing cables being decommissioned:

  - It is assumed that the incumbent provider (Flow) continues to use the MAYA-1 and CJFS cables to provide primary and backup connectivity to on-island consumers of capacity. It is therefore assumed that, in a scenario in which the legacy infrastructure continues to operate as it does today, there is no demand on a new cable for connectivity from Flow. Flow's affiliates are assumed here to control [redacted] of the market for connectivity on the Cayman Islands, which significantly reduces the available market.
  - Of the remaining [redacted] of the market, it is assumed on the basis of stakeholder discussions that the market will purchase redundancy of linear bandwidth at a ratio of [redacted] – i.e. buy its desired bandwidth via two routes. There are three possible routes for international connectivity to/from the Cayman Islands through which this linear bandwidth could be accommodated, if redundancy is required, as shown below:
    - MAYA-1 and CJFS;
    - MAYA-1 and a new cable; and
    - CJFS and a new cable.

    A new cable might therefore capture half of the bought, linear bandwidth for two-thirds of the non-Flow market. An alternative assumption however, which is adopted as the central case for this OBC is that <u>all</u> non-Flow providers would choose to use a new cable as part of their redundancy solution, meaning that a new cable might capture half of all the non-Flow market. This would be on the basis that a CIG-sponsored provider would be motivated by providing open access and straightforward service provision to any economic operator, as described in the Economic Case of this OBC. This might be characterised by:
    - publishing pricing transparently;
    - being empowered to make swift deals;
    - selling capacity in flexibly sized units;
    - allowing customers to change their capacity requirements as required;

- due to having effectively unlimited capacity (initially at least) not being distracted by planning capacity upgrades that balance affiliate company needs with those of third parties; and
- as existing cables age further, potentially offering a reliability advantage.

- The calculation described is summarised in the table below.

Table 8: calculation of market share prior decommissioning of an existing cable

Item	[redacted]
Total demand today (subject to future growth)	
Purchased to used ratio of 1.5:1	
Remove Flow's [redacted] market shar	
Assume purchased redundancy ratio of [redacted]	
Assume half of all of this deman for capacity is accommodated o the new cable	

- For the purposes of financial modelling, a central case assumption is therefore made that, prior to any decommissioning of existing cables, a new cable would be able to sell purchased capacity equal to [redacted] of the total, underlying demand from the Cayman Islands.

Following decommissioning of one of the existing cables:

- It may be assumed that the CIG-sponsored cable would necessarily provide half of the linear bandwidth necessary to achieve a purchased redundancy ratio of [redacted] as shown in the table below.

Table 9: calculation of market share post decommissioning of existing cable

Item	Gbps	% of today's	[redacted]
Total demand today (subject to future growth)			
Purchased to used ratio of 1.5:1			
Remove Flow's [redacted] market sha			
Assume purchased redundancy ratio of [redacted]			
Assume half of all of this deman for capacity is accommodated o the new cable			

- **Elasticity of demand**

  Price elasticity of demand refers to the change in consumption of a product in relation to a change in its price, and can be considered separately from the anticipated background demand growth rate.

In developing this OBC, consideration has been given to whether a reduction in the price of subsea connectivity is likely to lead to an increase in the use of digital connectivity in the Cayman Islands — in other words, the price elasticity of demand for connectivity to the price of subsea connectivity. To assess this, the extent to which a change in the price of subsea digital connectivity affects the change in price of services to households and businesses has to be assessed.

The cost of subsea connectivity appears to be a small element of the price that is ultimately charged to consumers such as households and businesses. There are multiple other considerations. On-island consumer prices are calibrated in view of a wide range of factors, including the need to invest in and maintain on-island infrastructure, and provide customer service, as shown in Figure 3 — which shows that this OBC estimates that the costs of international connectivity to on-island telecoms providers may around or less than [redacted] of overall charges to broadband and mobile internet users even in future and potentially less in many cases currently, as explained below.

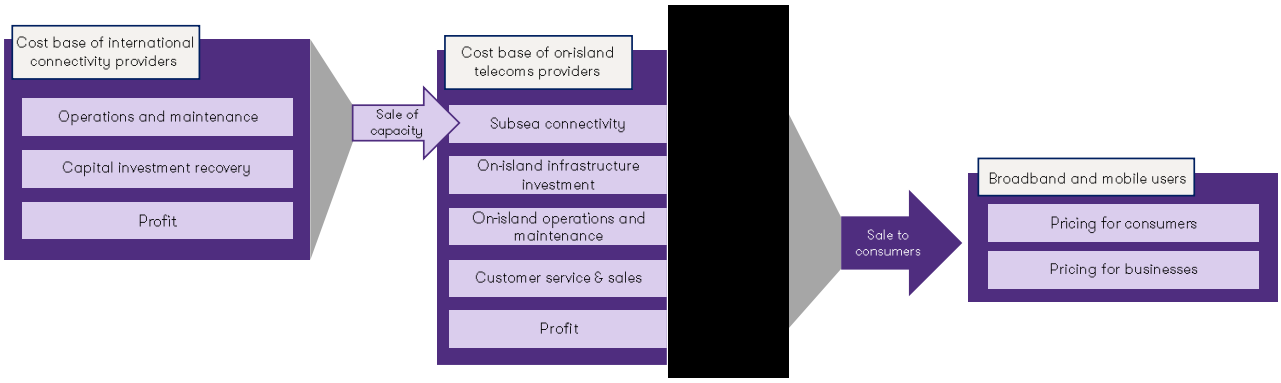


Figure 3: subsea connectivity costs in wider commercial context, with estimated percentages of cost base

In making a comparison between international connectivity pricing and the pricing of broadband services to consumers and businesses, it should be noted that telecoms providers do not buy from cable providers the bandwidth to support the full speeds that they sell onwards to consumers, because all consumers do not typically use all of the bandwidth available to them at the same time for internationally routed traffic. In other words, while domestic consumers who buy a 1Gbps connection may sometimes use 1Gbps, not all customers who buy a 1Gbps connection will use 1Gbps at the same time. Therefore the total capacity required by the telecom provider is less than the capacity that it sells onwards to consumers. (A comparison may be drawn to banks, which may not typically hold the full value of customers' cash deposits in cash, because they do not anticipate that all customers will withdraw their funds at the same time.)

The cost base estimate presented above is derived as follows:

- it is assumed that in a large customer base with connections offering 1Gbps (for which the domestic price is typically around [redacted]/month), the average demand for connectivity from each customer at any moment in time is that required to stream an HD video — approximately 5Mbs — which is only approximately [redacted] of the maximum capacity of each connection
- this would mean that each Gbps of subsea connectivity could serve approximately 200 consumers, each of whom pays for a 1Gbps connection — bringing revenue of [redacted] per connection price is assumed
- later in this Financial Case, an illustrative estimate is made of the future cost for linear, international connectivity (i.e. without any redundancy purchased via multiple cables) without CIG intervention. This estimate is [redacted] per month per 10Gbps.
- if the price of subsea connectivity is estimated to cost [redacted] per month per 10Gbps of *linear* capacity, or [redacted] with redundancy via two connections, then the cost of providing connectivity for 200 connections offering 1Gbps is [redacted]

- [redacted].
- Some purchasers of subsea connectivity currently appear to be experiencing significantly lower costs than [redacted] per 10Gbps per month via existing infrastructure.

Therefore as only a relatively small percentage of mobile/broadband pricing is made up of the cost of subsea connectivity, there would be significantly limited price elasticity of demand to subsea cost. However, in order to assess the effects of increased demand, sensitivity analysis relating to demand has been conducted as explained in following sections of this Financial Case.

- **Demand from other jurisdictions**

  Work has been conducted in assembling this OBC to consider the scope for a new cable to provide capacity to third parties in other jurisdictions. This would effectively mean that the Cayman Islands would start to act as a 'hub', from which data would be transmitted onwards to the NAP through a new CIG cable.

  This prospect is highly uncertain, however. Of the principal possible markets, Jamaica and Cancun already have relatively high degrees of connectivity and competition, while Cuba presents potential political challenges. Although there might be other locations, onwards from the Cayman Islands (for example Honduras or Nicaragua), serving these markets would involve significant further capital costs and risks, which are outside the scope of this business case. Given that the ability to achieve this is uncertain, this Financial Case does not assume any sale of onwards capacity to third-party jurisdictions.

  To avoid undue delay to progressing a solution for the Cayman Islands itself, CIG would likely have to commit to an option before confirming any use of it as an onward hub. Government bodies in relevant jurisdictions could be approached, however, and if opportunities are found and successfully realised, there could be very significant upside financial impacts. In order to assess the possible extent of these sources, sensitivity analysis is conducted as explained in the following sections of this Financial Case.

  This kind of opportunity would be most relevant to the [redacted] self-build option where there would likely be spare fibre pairs built into even a minimum specification of cable. It would only be possible on a 'spur' option if the commercial terms for the spur permitted the reselling of capacity to third-party jurisdictions and if the infrastructure and trunk capacity being secured is sufficient to support it. Cable Co should therefore seek to ensure that these issues are addressed in commercial negotiations.

- **Demand between Grand Cayman and the sister islands**

  Given the very limited population of the sister islands, it is assumed that additional revenue associated with a new link between Grand Cayman and Cayman Brac would be negligible, and has not therefore been modelled.

F. Financing approaches

43. Different financing approaches have the potential to change the cashflow requirements of a project considerably. Modelling has therefore been undertaken to consider different approaches to financing the project.

44. As the Commercial Case of this OBC concludes, the most appropriate commercial structure for the SPV or "Cable Co" would be for it to be wholly owned by CIG. However, the ownership status of Cable Co does not necessarily imply any particular financing approach.

45. In order to consider different financing approaches systematically, an assumption is therefore made that Cable Co is established by CIG to deliver the project, both by undertaking the contracting of delivery of the cable, for paying ongoing costs associated with operations and maintenance, and for generating revenue by selling capacity into the Cayman Islands market once the cable has been delivered. Any revenue that remains after the project costs have been serviced can be distributed from the SPV.

46. This assumption allows a variety of scenarios to be considered:

i. Cable Co could raise private debt against future revenue streams to cover the full costs of construction.

   Provision of a government guarantee to Cable Co (for example, to provide assurances about the level of revenue received) could decrease the cost of borrowing, but would introduce financial exposure to the government.

ii. Secondly, Cable Co could be fully funded by the CIG to deliver the cable, with the funds being raised by CIG through government borrowing or taxation. As government finances are fungible, the cost of this is assumed to be equal to the cost of borrowing for the CIG, which is assumed in the model to be [redacted]

   ([redacted] has been used as the CIG's cost of borrowing as it is understood that in June 2022, CIG drew down [redacted] of a credit facility, which is at a fixed rate of [redacted] It is understood that these funds have been invested in US Treasury notes in order to offset the cost of borrowing and to allow CIG to use the funds when required.[9] However, global interest rates currently appear to be rising and it is possible that this could have consequences for the rates at which CIG is able to borrow further funds. There is thus significant uncertainty and risk around this assumption.)

   Digital capacity is then sold by Cable Co, and the revenues from sale of capacity are used by Cable Co to fund operations and maintenance. Revenue over and above the funds necessary to fund operations and maintenance is distributed to CIG.

iii. Third, an approach is possible whereby CIG does not seek to recover the capital costs of the project in financial terms, and solely requires Cable Co to raise sufficient revenue to fund its ongoing operations and maintenance. Such an approach could be justified by the significant economic benefits brought to the Cayman Islands by a new cable.

47. Both approaches (ii) and (iii) require significant up-front finance from CIG, as the capital costs are significant and the project does not begin to generate revenue until construction is complete, which is assumed to take up to 36 months. In order to reduce these upfront costs, it may be possible to borrow commercially against the future revenues of the project to partially fund its construction cost.

    The extent to which such borrowing may be possible is likely to depend on commercial lenders' perception of the risk surrounding the project. Factors that are likely to be considered include:

    - the seniority of the debt against government debt (i.e. in the absence of a shortfall in revenue, which debt takes priority?).
    - risks to the project, including the likelihood of reactive competitive behaviour by the incumbent and the level of Cable Co's control over pricing.
    - the complexity of the commercial arrangements and the lender's familiarity with the digital connectivity sector.
    - the rate of return and ability to service any borrowings under different scenarios .

    It may be possible to secure favourable rates on borrowing if funds were sought from investors with a particular interest in securing the Cayman Islands' future digital connectivity. For example, Cable Co could investigate developing a 'Broadband Bond' which could be sold to local businesses with an interest in developing resilient connectivity for the islands. This may allow Cable Co to achieve costs of borrowing that are below what might be available on the open market. However, no precedents for this approach in the telecoms sector have been identified in development of this OBC.

iv. There is an approach under which the government and the private sector jointly provide equity to fund the initial construction of the project. Any financial returns from the project after

[9] https://www.gov.ky/news/press-release-details/cig-draws-us$393m-in-local-loan-funds,-invests-in-us-treasury-notes

operational and maintenance costs have been serviced could be returned to the investors in direct proportion to their initial investment.

This option was discounted in the Commercial Case, on the grounds that transferring risk to private sector partners in this way is unlikely to be possible on terms which would be compatible with meeting CIG's objectives for the project.

48. The advantages and disadvantages of these four different financing approaches are set out in Table 10 below.

Table 10: financing approaches

Cable Co financing sources	Pros	Cons
Private debt alone	No government investment needed. Costs of project are fully borne by users of digital connectivity in the Cayman Islands (with risk falling to the lender), with no contribution required from taxpayers.	Unlikely to be viable from typical lenders given the inherent uncertainty about revenue streams and risks to the project (including those from potential litigation). If viable, the cost of borrowing likely to be high given the above risks. Project will have to demonstrate a commercial return Government guarantee could reduce the cost of borrowing, but would negate the benefits of this approach and may ultimately be required to secure commercial debt. Lenders may require government to give up control of pricing in order to guarantee repayment of debt.
Government borrowing	Will be the most affordable source of finance. Preserves CIG control of sale of capacity and pricing.	Risks covered by taxpayers in the Cayman Islands rather than users of internet connectivity. Significant upfront capital cost for CIG with potentially long pay-back period. CIG may not have sufficient funding to invest in the project
Government grant	Allows CIG to invest in economic future of the islands. Reduces the price that would need to be charged to consumers to deliver financial viability. Potential for operational surpluses if revenues can cover more than operating costs	Places costs of capital construction on general taxpayers rather than users of digital connectivity. Significant upfront capital cost for CIG that is not expected to be recovered. Might require demonstration of a strong economic case in the context of a market failure to avoid State Aid issues.

Government borrowing or grant & private debt	Reduces upfront capital cost to CIG while preserving some level of government control.	Same issues around government grant as above. Government borrowing exposes Cayman Islands taxpayers to some risk on the project, and a potentially long pay-back period. Some uncertainty at this stage as to whether it would be possible to raise private debt against project revenue streams while leaving government discretion on issues such as pricing. Any commercial debt will be more expensive than Government borrowing

49. On the basis of the analysis above, options involving private debt appear to have limited advantages. In addition the viability assessment of private sector debt will be assessed further within the financial modelling results below.

G. Financial risks

50. In order to assess the key financial risks of the project, a workshop was held with relevant stakeholders to generate a risk register and understand the mitigation measures required to be put in place to manage the identified risks. As part of this exercise a provisional quantification of the risk values and probability was calculated to provide an expected overall impact on the financial inputs. However, it was agreed that the Optimism Bias provision noted above in Section C of [redacted] would be used as a proxy for specific risks in the financial model as this was in line with current guidance. The specific risks would however provide a base reference point at a subsequent stage of the project for a detailed risk register. The expectation would therefore be that as the project develops the Optimism Bias allowance would reduce over time and be replaced by specific risks values as these are determined as the project moves in to procurement and delivery stages. The specific risks identified in the workshop are set out in Table 11 below, along with a description and the proxy value that was agreed during the workshop.

Table 11: financial risks

#	Risk	Description	How factor is considered in this Financial Case
1	Capex higher than estimated	There is a financial risk that the 'fixed price' costs of acquiring the cable and the costs of laying the cable exceed current estimates. The probability of this risk is quite high at an estimated 70% chance of occurrence, given the ongoing high inflation to the cost of materials required. Any overspend in capital expenditure will have a direct impact on the price offered to users.	The estimated impact varies depending on the materials required and the expected length of cable. To build directly to [redacted] has the highest expected impact of [redacted] due to the length of cable required being far higher than the other options. To build directly to [redacted]
2	Opex higher than estimated	There is a financial risk that other overheads associated with the new cable exceed current estimates	Due to the greater length of cable required to [redacted] The [redacted]
3	Unexpected issues during survey	There is the risk that previously unknown obstacles are discovered when undertaken a survey of the desired route. This could lead to rerouting, which will increase capital expenditure.	The expected impact has been estimated according to the expected length of cable required for each option. To build directly to [redacted] With minimal cable laying required, the expected impact for the spur option is [redacted]

#	Risk	Description	How factor is considered in this Financial Case
[redacted]			
7	Protracted permitting process	There is the financial risk that the process of acquiring a permit to bring the cable to shore at the mainland end could take longer than expected. This could lead to a potential bottleneck towards completion, and increased permitting costs. The probability of this is relatively low, with an estimated chance of 30%, but the impact range is expected to be quite	The expected impact of this risk is estimated to be $120k for either to build directly to [redacted] or to build [redacted]; and $75k for a spur option. For the base financial model, an optimism bias of [redacted] has been considered for each of the options, so that the expected impact of this risk is considered within the expected capital expenditure.

#	Risk	Description	How factor is considered in this Financial Case
		wide, as the impact is highly dependent on the length of delay or reasoning for the protraction.	
8	Frequency of faults higher than expected	Upon completion, there is an ongoing risk that the frequency of faults along the cable is higher than expected. The probability of this risk is estimated to be low, with a [redacted] chance of occurrence.	With appropriate specification and participation in a maintenance ship syndicate, the expected impact can be mitigated. With this in mind, the risk is estimated to have an expected impact of [redacted] for each of the options considered in the Financial Case, reflecting the additional ships required for maintenance. For the base financial model, an optimism bias of [redacted] has been considered in the operating costs for each of the options, to consider the expected impact.

H. Results of financial analysis

51. This section presents the results of the financial analysis conducted at OBC stage, in line with the assumptions detailed above.

52. For the purposes of developing the financial model it has been assumed that Cable Co is established as an SPV to deliver the project, including for undertaking the contracting of delivery of the cable, for paying ongoing costs associated with operations and maintenance, and for generating revenue by selling capacity into the Cayman Islands market once the cable has been delivered. This structure should provide the lowest costs option prior to taking account of the specific project risks. Three financing scenarios are considered per the table below.

Table 12: overview of financing scenarios

Number	Financing Scenario	Summary
1	**Government debt financing**	Assumption that CIG would provide 100% financing by way of a government loan which would require to repay the capital and interest (assumed to be chargeable at [redacted]
2	**Matching the potential price from a commercial operator**	Assumption that CIG would provide 100% financing, on terms set to ensure that the revenue generated from the market would be similar to an illustrative estimate of what a private sector provider might commercially require.
3	**Full capex grant funding by CIG**	Assumption that CIG would provide 100% grant funding which would not require to be repaid and the capital costs would therefore not be recovered by CIG for each option

53. For each of the above scenarios the models have been solved to ensure that the cashflow at the end of the 28-year assessment period would be nil, and to ensure that loan and overdraft repayments have been made in full.

54. Where the results of the above show that the necessary revenue stream would be lower than it is assumed would be required by a private sector cable developer, the possibility of introducing an element of commercial debt to improve capital affordability of the project to CIG is also then considered.

Scenario 1: Government debt financing

55. This option was tested to see what pricing for international connectivity could be achieved under a fully government funded option where the government seeks to recover its funding along with its cost of borrowing.

56. The key assumptions for this scenario include;

- Timeline – The model starts in July 2022, and the construction starts in Jan 2023, and takes place for a period of 30 months. Construction ends in July 2025. The operating of the cable begins Aug 2025 and lasts for a period of 25 year and therefore ends in July 2050. The existing cable is assumed to be decommissioned in July 2027, and therefore for the initial period, between Aug 2025 and July 2027 the new operating cable operates at a reduced market share of [redacted] Post decommissioning the market share is assumed to be 100%
- Capital Costs – Capital costs are consistent with the current estimates by Pioneer Consulting as given in Table 2.
- Financing – Debt has a cost of [redacted]
- Operating Costs – Operating costs are consistent with the current estimates by Pioneer Consulting as given in Table 6.
- No additional profit is assumed for provision of the capacity after servicing the debt and interest costs.
- The model is solved to ensure that the loan is fully repaid and there is a nil cash balance at the end of the operational period. The capacity is used to calculate the monthly revenue requirement per 10 Gbps of assumed, existing equivalent market share. The current expected capacity is [redacted] Gbps, and with the growth assumptions we have in the model by the start of the operating phase, the expected capacity would be [redacted] Gbps in 2025.
- The results in terms of revenue requirement per 10Gbps of assumed, existing equivalent market share are shown below

Table 13: results of Scenario 1[10]

[redacted]

57. Although the revenue requirement above may be higher than the price point experienced by some purchasers in the market currently (which market intelligence suggest might be around [redacted] per 10 Gbps per month or lower in some cases), these figures are more comparable – and in some cases lower - than we have assessed might be required by a new cable delivered by an entirely private venture (see Appendix 3). See Scenario 2 for further assessment of this.

58. As noted above this option has been developed on the assumption that the funding is provided by CIG rather than a private sector lender. If a private sector lender was to provide the finance without being given comprehensive guarantees by CIG, then the forecast, sustainable revenue requirement would be higher than assessed above.

[10] Source: financial modelling conducted for this OBC

Scenario 2: matching a private sector operator

59. To determine how a commercial, private sector operator would approach developing new cable infrastructure a financial model was developed as detailed in Appendix 3. The results of this financial assessment was that a commercial operator would develop equivalent infrastructure to the Illustrative Spur option. The financial analysis concluded that a commercial operator would be able to charge [redacted] per month per 10Gbps in order to make a commercial return and repay any debt to develop the infrastructure. With this price used to indicate a target level of revenue generated from the market, a sensitivity assessment on the [redacted] and [redacted] options was undertaken in order to determine what level of interest rate reduction (or if necessary, further grant funding) would be necessary in order to be able to match the level of revenue generated from the market to the estimate of the private sector's required revenue.

60. The key assumptions for this scenario include;

- Timeline – as above in Scenario 1
- Capital Costs – Capital costs are consistent with the current estimates by Pioneer Consulting as given in Table 2.
- Financing – Debt initially has a cost of [redacted] stepping down until a serviceable rate is found
- Operating Costs – Operating costs are consistent with the current estimates by Pioneer Consulting as given in in Table 6 below.
- Table 6
- No additional profit is assumed for provision of the capacity after servicing the debt and interest costs.
- The model is again solved to ensure the operating costs (including debt service) and revenues are equal. The current expected capacity is [redacted] Gbps, and with the growth assumptions we have in the model by the start of the operating phase, the expected capacity would be [redacted].
- The results show that the [redacted] with link to Cayman Brac option would require reducing the interest rate to [redacted]. For the Spur the equivalent interest rate is [redacted]. No other options require a rate reduction or grant.

Table 14: overview of funding requirements including and excluding link to Cayman Brac[11]

	[redacted]	[redacted]	**Illustrative Spur**
With link to Cayman Brac	No grant, [redacted] loan	No grant or reduced interest rate required (see previous Scenario) Matching price could be sustained with debt interest rate of [redacted]	No grant, [redacted] loan
Without link to Cayman Brac	No grant or reduced interest rate required (see previous Scenario) Matching price could be sustained with debt interest rate of [redacted]	No grant or reduced interest rate required (see previous Scenario) Matching price could be sustained with debt interest rate of [redacted]	No grant or reduced interest rate required (see previous Scenario) Matching price could be sustained with debt interest rate of [redacted]

61. As noted in the table above, two of the six options are unable to repay the government debt at [redacted] and would require more advantageous funding to be provided by CIG. The [redacted] option, however, appears to be able to match the assessed private sector price point while sustaining some commercial debt.

[11] Source: financial modelling conducted for this OBC

Scenario 3: full capex grant funding by CIG

62. In this scenario it is assumed that the capex is fully funded using a non-repayable grant from CIG to establish what the revenue requirement would be if the capital funding and associated costs were effectively funded by the CIG with no requirement to recover this investment from the operational revenues. These capital investment values are shown in the table below. This investment would be used to reduce the overall price to end users. Note that the values below include Optimism Bias but do not include the effects of inflation.

Table 15: capital investment values[12]

[redacted]

63. The key assumptions for this scenario include:

- Timeline – as above in Scenario 1
- Capital Costs – Capital costs are consistent with the current estimates by Pioneer Consulting as given in Table 2.
- Financing – Debt initially has a cost of [redacted]
- Operating Costs – Operating costs are consistent with the current estimates by Pioneer Consulting as given in in Table 6 below.
- Table 6
- No additional profit is assumed for provision of the capacity after covering the costs of provision.
- The model is once again solved to ensure the operating costs and revenues are equal. The capacity is used to present the monthly revenue requirement per 10 Gbps of assumed, existing equivalent market share. The current expected capacity is [redacted] Gbps, and with the growth assumptions we have in the model by the start of the operating phase, the expected capacity would be [redacted] in 2025.
- The results in terms of revenue requirement per 10Gbps of assumed, existing equivalent market share are shown below

Table 16: results of scenario 3[13]

[redacted]

- Even if the infrastructure was fully grant funded the table above highlights that the revenue that would need to be generated from the market is still higher than might be consistent with some pricing of capacity on existing infrastructure in the market today (and probably in future) which could be around [redacted] or lower in some cases). So those price points could only be improved upon by subsidising ongoing operating and maintenance costs. However, the revenue requirement on the above basis is significantly lower for all options than the

[12] Source: cost estimates developed by Pioneer Consulting for this OBC
[13] Source: financial modelling conducted for this OBC

assessed price that a private sector cable developer (replacing the MAYA-1 cable in due course) could achieve.

I. Sensitivity Analysis

Construction of two cables simultaneously

64. In this set of scenarios, we have modelled options for developing two cables simultaneously. These options are:

    - Combined Option 1: [redacted] self-build with a branch to Cayman Brac, and a spur option; and
    - Combined Option 2: Two spur connections plus a standalone link between Grand Cayman and Cayman Brac.

65. To do so we use the capex and opex for two separate cables. We note that the same capex and opex assumptions are used as in the single-cable analysis, without any assumed efficiencies of scale as in practice these are anticipated to be within the range of uncertainty around costs estimates at this business case stage.

66. In each configuration above, two variations on the timing of when CJFS could feasibly go out of commission are tested. For a "**Best case**" financial outcome to this project, it is assumed that it goes out of commission relatively early in [redacted] — at the same time the analysis assumes MAYA-1 is decommissioned. In the "**Worse case"** we assume that the cable goes out commission later, in [redacted]. It is assumed that the combined option (with two cable connections) still only captures [redacted] of the market for linear capacity until the point at which CJFS goes out of commission, at which point the market demand increases to [redacted]. The results of the analysis can be seen below.

67. Furthermore, an additional analysis was conducted to find the funding required, via interest rate reduction and, if necessary, grant funding, that would allow the operator to only require revenue of [redacted] per month per 10Gbps of assumed, existing equivalent market share, which is the revenue per 10Gbps that it has been estimated that a private sector operator would need to charge to make a commercial return by constructing a single spur. Those results are also shown below.

68. Under these assumptions, the required revenue per 10Gbps varies between approximately [redacted] (for Combined Option 2, in which two spur connections and a link to Cayman Brac are built, and CJFS is decommissioned in [redacted]), and approximately [redacted] (for Combined Option 1, in which a self-build to [redacted] with a branch to Cayman Brac, and a spur are built, and CJFS continues to operate until [redacted]).

69. These results may be lower than might be expected, given that multiple projects are assumed to be constructed. This is because of the assumption that the capacity/demand for data broadly doubles in the long term, but the costs increase by less than [redacted] (largely because it is assumed that two links between Grand Cayman and the Sister Islands are not included and assumed not to be needed). As a result, the effect is that the price that is required to be charged to break-even is less than in the original cases. We note that in the worst cases shown that the analysis is highly sensitive to the timeframe which the second existing cable is decommissioned: an increase of 5 years increases revenue requirement costs by [redacted] in Scenario 1, and [redacted] in Scenario 2.

Table 17: results of sensitivity analysis considering combinations of options[14]

[redacted]

[14] Source: financial modelling conducted for this OBC

Uncertainty around decommissioning of MAYA 1

70. We ran Scenarios 1 and 3 (full grant funding of capex) from above again, with an additional sensitivity test – where the existing cable continues in service for [redacted], and is decommissioned in [redacted]. The scenarios are then solved for the same conditions as above, i.e., solved such that any loans are fully paid, and there is zero cash position in the final period of the model. As can be seen, this results in the need for higher pricing to recover the costs over the full asset life.

Table 18: results of sensitivity analysis showing later decommissioning of MAYA-1[15]

[redacted]

[15] Source: financial modelling conducted for this OBC

Risk of capex overspend

71. An overspend of capex was modelled with a worst case of [redacted] was determined to be the limit, and the scenarios below assume again the model is fully solved, and there is zero cash position in the final period of the model

[redacted]

[redacted]

[16] Source: financial modelling conducted for this OBC

Risk of revenue shortfall

72. In this scenario we project that [redacted] of demand is fulfilled, based on the solved price that was determined in the first sensitivity analysis. This might be a typical scenario that a lender might see. The figures in the table therefore relate to the debt that accrues at the end of the project as a result of being unable to cover the costs. In practice it might be possible to manage this scenario by increasing the price to users of cable capacity unless the demand shortfall is due to competition for market share.

Table 20: debt remaining in Cable Co at the end of the asset life if there is a revenue shortfall[17]

[redacted]

[17] Source: financial modelling conducted for this OBC

Selling capacity on to a third party

73. In this set of scenarios, we have modelled an additional revenue stream, where a cable developer installs a cable from a different location in another national jurisdiction, to the Cayman Islands, and then pays for separate usage on the CIGs cable to secure a connection to the [redacted] In the tables below we have modelled the capacity that would have to be purchased by the third party at an entirely illustrative fixed price of [redacted] Gbps/month that would allow Cable Co to provide international connectivity to the Cayman Islands at zero cost. We note that in the scenarios above the initial demand within the Cayman Islands itself is estimated to be [redacted]

74. Although this scenario is entirely hypothetical and cannot be relied upon, it can be seen that the benefits of this opportunity would be very significant for CIG because, in practice, this income could make a very significant contribution to the financing of a second new cable connection for the Cayman Islands.

[redacted]

[18] Source: financial modelling conducted for this OBC

Market Rate Debt

75. In this scenario we use the pricing in Scenario 1 above but solve the model with a cost of debt of [redacted]. As the cost of debt is much higher in these scenarios, the debt is not fully repaid. The figures in the table therefore relate to the debt that accrues at the end of the project as a result of being unable to cover the costs.

[redacted]

[19] Source: financial modelling conducted for this OBC

J. Conclusion

76. The Financial Case considers the financial forecasts for delivering the cable infrastructure through different funding options and compares this to an estimate of the pricing that a commercial operator might have to charge for use of new infrastructure installed at some future date. This case sets out the financial assumptions used in the baseline scenario and performs a number of sensitivity tests to demonstrate the financial impact of changes to the key assumptions.

77. The capital cost, operating costs and demand projections were developed by Pioneer Consulting using current market assumptions and market intelligence from other similar projects. To ensure the financial forecasts were adjusted for Optimism Bias an allowance of [redacted] was provided for on both capital and operating costs. As the project develops this should reduce and be replaced with specific project risks through the procurement and development phase.

78. A key assumption within the financial forecasts is the date at which a second existing cable ceases to be available to provide backup connectivity to on-island consumers of capacity. In the central case it is assumed that there is one remaining cable from [redacted] and a sensitivity test has been provided which assumes that this is delayed until [redacted].

79. As concluded in the Commercial Case the most appropriate commercial structure for the SPV or "Cable Co" would be for it to be wholly owned by CIG. Moreover, the analysis has demonstrated that there would be a significant increase in debt at the end of the project assuming commercial rates of finance potentially making this funding route unviable. The Financial Case has therefore assessed the financing approach for this SPV and the expected prices for different scenarios.

80. The different funding scenarios included:

- Cable Co could raise private debt against future revenue streams to cover the full costs of construction.
- Secondly, Cable Co could be fully funded by the CIG to deliver the cable, with the funds being raised by CIG through government borrowing or taxation.
- Third, an approach is possible whereby CIG does not seek to recover the capital costs of the project in financial terms, and solely requires Cable Co to raise sufficient revenue to fund its ongoing operations and maintenance.

81. While there are qualitative advantages and disadvantages with each option the Financial Case has focused on the quantitative assessment.

82. The initial assessment was undertaken on a SPV which is fully government financed at an assumed rate of [redacted] The resulting revenue requirement to make this financially sustainable is noted below for each option on the assumption that all finance is paid back and the SPV has a nil cash balance at the end of the evaluation period (the revenue requirement is presented as $/month per 10Gbps of market share based on current market size):

Table 23: results of Scenario 1[20]

[redacted]

83. The revenue requirement of each option compares to the market intelligence that international connectivity might currently be purchased on existing infrastructure at a price point of around

[20] Source: financial modelling conducted for this OBC

[redacted] per 10 Gbps per month or lower in some cases. Based on this analysis then, any new infrastructure which requires full repayment of government financing will need to generate more revenue from the market than existing infrastructure, on the basis that the capital costs of such infrastructure may have been fully amortised. However, that existing infrastructure cannot continue indefinitely on that basis.

84. Using a similar method of analysis, an assessment has been made of what the revenue requirement would be for a private sector developer delivering infrastructure similar to e.g. the Illustrative Spur option used in this Financial Case (based on [redacted] infrastructure option without connection to Cayman Brac). If a commercial operator was required to develop new infrastructure it was assumed that this would be financed by a parent company loan at 8% to ensure an appropriate blended return. It is estimated that, in order to repay the debt (and provide a market return) they would require to charge [redacted] per 10gbps per month. Using the same method of analysis, this would be higher than the revenue requirement of a government funded SPV to deliver all options assessed, except for delivering a link to Cayman Brac in conjunction with the [redacted] self-build and Illustrative Spur options.

85. A financial assessment was also undertaken to understand how the funding assumptions would need to change in order for a fully government funded SPV only to need a similar level of revenue from the market as this illustrative private sector solution and the results are noted below:

Table 24: overview of funding requirements including and excluding link to Cayman Brac[21]

[redacted]

86. This highlights that in order to deliver a link to Cayman Brac in conjunction with either a self-build to [redacted] or an Illustrative Spur option CIG would have to provide the necessary capital loan at a more advantageous rate of [redacted] respectively – lower than the cost of government borrowing assumed for this business case ([redacted] For these options, if full-rate government financing would not be financially viable then commercial funding, which would be higher, would make the funding gap worse.

87. To understand the sensitivity of the funding rate of the three core options without links to Cayman Brac we assessed the potential increase in interest rate that would be sustainable while still matching the revenue requirement to the [redacted] per month per 10Gbps that we estimate might be required by a commercial operator. The resulting interest rates are shown below.

Table 25: change in interest rates required to match the revenue requirement

[redacted]

88. The final analysis undertaken was to understand if new infrastructure could be provided at a similar cost to the existing infrastructure which we understand could be priced at around [redacted] per 10 Gbps per month or lower in some cases. For this purpose it was assumed that CIG would fully fund the capex and not require any repayment of this funding and that operating costs and

[21] Source: financial modelling conducted for this OBC

revenues were effectively matched for the operational period. The level of revenue required on this basis is detailed below:

Table 26: results of scenario 3[22]

[redacted]

89. The table highlights that it is not possible to get below the indicative value of [redacted] per 10 Gbps per month which we understand might be indicative of some pricing in the market currently, but the Illustrative Spur option without connection to Cayman Brac does come relatively close to this level. However, this does require the CIG to fully capital fund the project which is summarised below, and as before includes optimism bias but no indexation.

[redacted]

90. As described in the Strategic Case of this OBC, it would be rational for CIG to choose to seek to build two separate cable simultaneously. The Financial Case therefore also presents analysis considering the implications of two combinations of options:

- Combined Option 1: [redacted] self-build and a spur option and the Brac-Link; and
- Combined Option 2: Two spur connections plus the Brac-Link.

91. The analysis considers these two options in two s[redacted]narios relating the date of decommissioning of the CJFS infrastructure — a 'best case' of [redacted] 2 [redacted] and a 'worst case' of .

92. Under these assumptions, the required revenue per 10Gbps varies between approximately [redacted] (for Combined Option2, in which two spur connections and a link to Cayman Brac are built, and CJFS is decommissioned in [redacted]), and approximately [redacted] (for Combined Option 1, in which a self-build to [redacted] a spur and a link to Cayman Brac are built, and CJFS continues to operate until [redacted]).

These results may be lower than might be expected, given that multiple projects are assumed to be constructed. This is because of the assumption that the capacity/demand for data doubles, but the cost increase is less than [redacted] - largely as a result of assuming the two separate links to Cayman Brac are not necessary. As a result, the effect is that the price that is required to be charged to break-even is in fact less than in the original cases. We note that in the worst cases the analysis is highly sensitive to the timeframe which CJFS is decommissioned: an increase of 5 years increases revenue requirement costs by [redacted] in Scenario 1, and [redacted] in Scenario 2. Clearly, the decommissioning date of CJFS cannot be known at the point that a decision to build a second cable is made, and the financial consequences of such a decision cannot therefore be certain.

[22] Source: financial modelling conducted for this OBC

Appendix 1: Capital Cost Categories

93. The capital cost estimates have been assembled under the following six headings:

- **Submerged plant**

  The following elements have been costed separately for each project, and incorporated into the overall capital cost estimates:

  - Unarmoured cable — it is assumed that the majority of each cable for each option will comprise unarmoured cable. The cost is estimated to be in the range [redacted] per km.
  - Single-armoured cable — this is assumed to be used in shallow waters, except for landings. Shallow water distances have been estimated on the basis of a desktop survey. The cost is estimated to be in the range [redacted] per km.
  - Double-armoured cable — 15km of double armoured cable is assumed to be used at each end of the cable as it approaches the shore. The cost is estimated to be in the range [redacted] per km.
  - Repeaters — one repeater is assumed to be used every [redacted] km. The cost for each repeater is estimated to be in the range [redacted].
  - Amplifier pairs — it is assumed that there are [redacted] fibre pairs per cable, and so [redacted] amplifier pairs are required for each repeater. The cost for each amplifier pair is estimated to be in the range [redacted].
  - Gain equaliser units — assumed that one is required every [redacted]. The cost for each is estimated to be in the range [redacted].

- **Marine operations**

  The following elements have been costed separately for each project, and incorporated into the overall capital cost estimates:

  - Deep water survey — estimated on the basis of cable length, with an assumed price per day for the survey ship of [redacted].
  - Shallow water survey — estimated on the basis of cable length, with an assumed price per day for the survey ship of [redacted].
  - Inshore surveys — estimated on the basis of cable length, with an assumed price per day for the survey ship of [redacted].
  - Time required for:
    - Route clearance — removal of out-of-service cables identified in the marine survey
    - Marine installation — it is assumed that a cable ship costs in the region of [redacted] per day, and can lay [redacted] of cable per day.
    - Burial — it is assumed the cable ship can buy [redacted] of cable per day.
  - Mobilisation and demobilisation of pre-laid shore ends (PLSEs)
  - Marine burial of PLSEs
  - Pipeline and cable crossings

- **Transmission equipment**

  These estimates include 1+1 sparing.

  - Dual-end power-feed equipment (PFE) — estimated at [redacted] per end
  - Line-monitoring equipment (LME) — estimated at [redacted] per end

- Equipment monitoring system (EMS)
- Transmission terminal pairs
- Line card pairs
- Cable station installation
- Test equipment

- **Terminal station**

  It is assumed that a local landing party is used for the remote end of a new cable, and that the landing party acts as landing party for other cables as well as any new cable connecting to the Cayman Islands. For this reason, the costs associated with the remote station are assumed to be shared between four parties and only **one quarter of the estimated costs associated with the station are therefore included in the costings**. The estimated costs of the terminal station are highly sensitive to this assumption.

  Were CIG to seek to become a landing party in a remote territory its own right, and construct its own remote cable station, the costs associated with the terminal station, noted below, might be expected to increase dramatically and at least double. It is considered that this is a very unlikely scenario as to take this approach would be extremely complicated for CIG.

  - Cable station land acquisition
  - Cable station construction
  - Primary power AC system
  - DC plant
  - Batteries
  - AC & DC cabling and grounding
  - Generators
  - AC and DC panel distribution systems
  - Cable racks
  - HVAC (High Voltage Alternative Current) equipment and distribution
  - Access control and CATV
  - Building management system
  - Fire detection and suppression systems
  - Telecom Infrastructure
  - Beach Man Hole (BMH) and Ocean Ground Bed (OGB) on the plot of the CLS
  - Forehaul cable from the beach manhole to the cable landing station
  - Other costs & contingencies

- **Spares**
  - Spare repeaters
  - Spare amplifier pairs
  - Spare repeaterless cable
  - Spare cable

- **Miscellaneous**
  - Desk top study
  - Training for managers at company site

- Training for regional staff
- Marine permits
- External project management and services.
- Minimal travel.

94. For the standalone link between Grand Cayman and Cayman Brac, a simpler approach to costing has been taken. This is because the system is technically simpler than an international cable as its length of only approximately 133km would mean that repeaterless technology could be used. For this system, higher-level estimates have been made under the following headings:

- **Submerged plant**
  - Repeaterless cable
  - Shore ends
  - Beach manholes
- **Marine operations**
  - Marine route survey
  - Transit
  - Loading
  - Mobilisation and demobilisation of cable ship
  - Installation
- **Transmission equipment**
- **Terminal equipment**
- **Spares**
  - Spare cable
- **Miscellaneous**
  - Permitting
  - Project management

Appendix 2: Operating Cost Categories

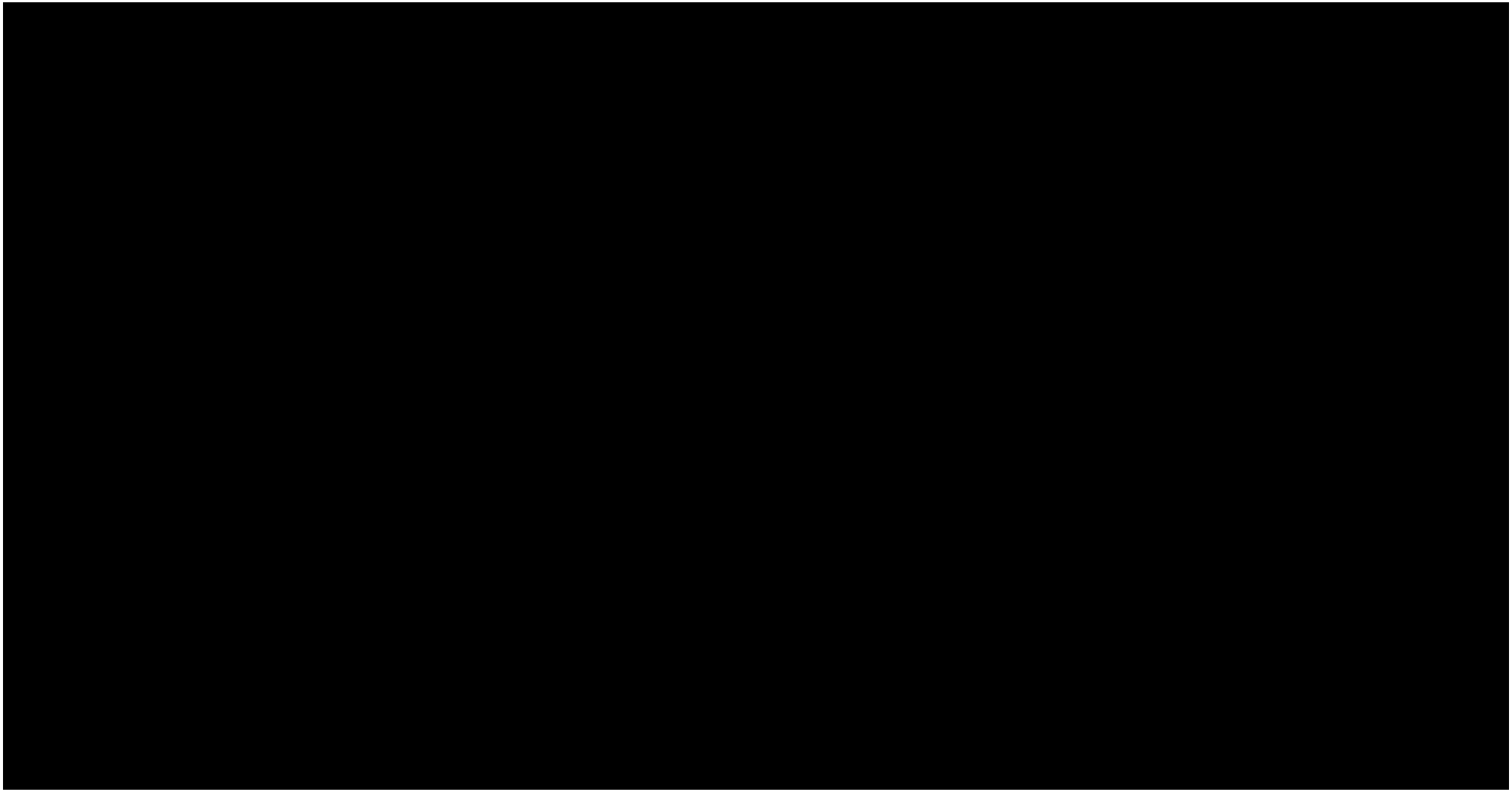
95. The operating cost estimates have been assembled under the following five headings:

- Cable system operational expenditure:
  - Industry costs, such as fishing liaisons — assumed to be [redacted] per year
  - Annual and recurring licensing and permitting fees — assumed to be [redacted] per year for [redacted] and [redacted] for a spur
  - Cable maintenance costs — estimated at [redacted] per km per year
  - Rental fees regarding a Landing Partner Agreement (LPA) — assumed to be [redacted] for a full landing, and [redacted] for a spur
  - Marine depot — estimated cost of storing spares totalling [redacted] of the system length
  - Marine repair — it is assumed that one repair is required every three years at [redacted] per repair
  - Storage of spares is assumed to carry no cost as it is assumed that there is space available in the Cable Landing Station
  - Network Operations Centre (assumed to be outsourced at [redacted] per year
  - Field engineers (assumed to be outsourced) at [redacted] per month per cable site
  - Service contract with equipment vendor, estimated at [redacted] of equipment value
  - Annual rent for Cayman cable landing station and power, assumed at [redacted] per year.
- General and administration operational expenditure is assumed at [redacted] per year, and covers:
  - Office rental fees;
  - Phone and communication costs;
  - IT support;
  - Insurance; and
  - legal fees and other costs associated with administration;
- Employee costs comprise 0.5FTE salaries for the following (salaries quoted are for 1FTE):
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
- Sales and marketing costs, with regard to conferences, travel and other related expenses are estimated at [redacted] per year.

- One-off costs:
  - One-off fee for [redacted] seabed Lease (relevant to a direct [redacted] link only), estimated at [redacted]; and
  - One off fee for Cayman seabed lease, estimated at [redacted]; and
- Onward connectivity from cable landing station (see main body of Financial Case).

Appendix 3: Costs of combined options

The following tables provide high-level estimates of the capital and operational costs of combinations of infrastructure options, by summing the costs of the component parts as estimated by Pioneer Consulting.



In order to generate high-level operational expenditure estimates for combinations of infrastructure options, the ‘cable system operational costs’ of each system have been summed in Table 29, and the costs associated with ‘General and Admin’ have been doubled. The costs associated with other categories, including the numbers of employees and budgets associated with sales and marketing, have been held the same as for a single system. The estimates show possible operational costs per year for multiple systems of between approximately [redacted] in today’s prices. It should be noted that these figures represent high-level estimates only.

[redacted]

Appendix 4: pricing of a commercial operator using new infrastructure

96. A private sector operator model has been developed to assess the minimum price point at which it might be commercially viable for a commercial operator to develop a new cable.

97. This has been used to understand the minimum pricing a commercial entity would need to charge for capacity for works similar to CIG's 'spur' option (the lowest capital cost option).

98. This helps to establish a baseline pricing level that a CIG cable would need to be able to match or improve upon if it is to have a beneficial impact on pricing of subsea connectivity in the Cayman Islands market. For this analysis, the same capital costs have been used as for the CIG 'Illustrative Spur' option, illustratively based on the estimate for works to connect with the TCFS cable.

99. The key assumptions used to model this scenario include:

- Timeline – The model starts in July 2022, and the construction starts in Jan 2023, for a period of 30 months takes place. Construction ends in July 2025. The operating of the cable begins Aug 2025 and lasts for a period of 25 years and therefore ends in July 2050. The existing cable is assumed to be decommissioned in [redacted], and therefore for the initial period, between [redacted] the new operating cable operates at a reduced market share [redacted]. After the decommissioning of MAYA-1, the market share is [redacted]
- Capital Costs – Capital costs are consistent with the current estimates by Pioneer Consulting for a spur as set out in Table 2 (illustrated using the [redacted] option)Table 2, as it is assumed that the infrastructure solutions that a commercial operator would identify would be similar to those considered in this Business Case. Of the three options, it is considered most likely that a commercial operator would choose a 'spur' option from another cable, as this is likely to represent the most attractive offer.
- Financing – Debt has a cost of [redacted], which represents a competitive cost of capital in the telecoms sector.
- Operating Costs – Operating costs for the different infrastructure options are consistent with the current estimates by Pioneer Consulting as given in in Table 6 below.
- Table 6.
- It is assumed that a commercial operator, who does not face any socio-economic objectives in the way that CIG does, would not construct the link between Grand Cayman and Cayman Brac, given the relatively limited commercial benefit and relatively high capital cost of doing so.
- To establish a minimum level, no profit is assumed for provision of the capacity to third party retailers (i.e. any profit is generated within an affiliated retailer selling directly to retail customers.
- The model is solved to ensure that the loan to the SPV that builds the cable is fully repaid. The capacity is used to solve the pricing required to achieve this. The current expected demand is [redacted] Gbps, and with the growth assumptions we have in the model by the start of the operating phase, the expected capacity would be [redacted] in 2025.

Table 30: pricing of a commercial operator using new infrastructure

[redacted]

Management Case

Management Case: table of contents

The following Annexes have also been provided as separate documents:

A. Introduction

1. This Management Case is structured as follows:

    - Following this introduction, **Section B** introduces the Management Case, describes how it fits into the broader context of this Outline Business Case, and explains its links to the other four cases.
    - **Section C** assesses the remaining lifetime of the existing subsea infrastructure, MAYA-1 and CJFS.
    - **Section D** considers the approach to establishing the 'Cable Co' SPV and the project management approach for delivering either a self-built cable or securing a right-of-use asset on another party's cable.
    - **Section E** describes and discusses the potential timeline for delivery of the project in light of the findings of Sections C and D.
    - **Section F** constitutes a Permit Feasibility Study, which identifies the permits required for a new cable.
    - **Section G** describes project risks, and discusses mitigation measures.
    - **Section H** describes the proposed approach to benefits identification, tracking and realisation for the project.
    - **Section I** concludes the Management Case by summarising its conclusions.

B. Role of the Management Case

2. The purpose of the Management Case of an Outline Business Case is to demonstrate that robust arrangements can be put in place for the delivery, monitoring and evaluation of a scheme.
3. This Section B describes the work undertaken on the Management Case at Strategic Outline Case (SOC) stage, and describes the work that has been conducted to move the project forward to OBC stage.

Management Case at SOC

4. At SOC stage a relatively high-level approach to the Management Case was taken, which is appropriate for that stage in the process of business case development. The case covered Governance Arrangements — where a steering committee was developed — Project Management, which noted that a project specialist to coordinate and lead work would be required, an estimated timeline, and an acknowledge for the need of advisers and consultants to support work.

Work undertaken at OBC

5. To develop work to the OBC stage, various workstreams have been undertaken which are recorded in this Management Case. These include:

    - consideration as to how CIG could develop a Special Purpose Vehicle to deliver the project;
    - an assessment of the lifetime remaining of the existing infrastructure, to support consideration of timescales;
    - reviewing and refining the project timeline;
    - a detailed Permit Feasibility Study; and
    - consideration of project delivery risks and potential mitigations; and
    - development of a high-level approach to benefits management.

C. Existing infrastructure lifetime

6. This section assesses the likely short to medium term futures of the existing international cables connecting Cayman Island. Looking at information available in the public domain, applying industry experience and drawing reasonable conclusions.

7. There are currently two digital subsea cables that connect the Cayman Islands to international destinations: CJFS and MAYA-1.

8. The Cayman-Jamaica Fibre System (CJFS) is a repeaterless subsea cable connecting Grand Cayman and Cayman Brac to Jamaica, which entered service in 1997. The section from Jamaica to Cayman Brac is approximately 340km long, with the intra-island link (Cayman Brac to Grand Cayman) roughly 48 km long. This system is believed to be 4 fibre pairs throughout. While this system is old (~25 years), as it is unrepeatered and relatively short, it is likely to suffer less from the age-related technology issues typically encountered on repeatered systems.

9. It is understood that CJFS's owners Cable & Wireless have undertaken multiple upgrades of the land-based transmission equipment used to light this fibre, with the current available "lit capacity" in the region of [redacted] Gbits/s (this is not the used capacity, which is expected to be significantly less). Current land-based transmission equipment used is understood to be a mix of Xtera and Corient.

10. Given the short system length, fibre type (Plastic scintillating fibres — 'PSF') and recent advancements in transmission technology, there is no reason why CJFS cannot continue to be upgraded for several years more. It is understood that the most recent assessment of CJFS indicated that an eventual capacity in the region of [redacted] Tbits/s per fibre pair (leading to a total of [redacted] Tbits/s for four fibre pairs) may be achievable.

11. With Cable & Wireless' economies of scale, especially with respect to staff costs which are expected to be one of the largest operating cost centres, the directly attributable operating cost for CJFS is likely to be very low. This coupled with both the ease of upgrade and future upgrade potential would suggest that there is little to no likelihood of CJFS being decommissioned in the short to medium-term, which might be considered to be a period of [redacted] years.

12. The other (second) submarine cable, MAYA-1, entered service in 2000, and spans 4,400km from [redacted] to Columbia with a landing station in Half Moon Bay on Grand Cayman, as well as landing stations in Mexico, Honduras, Costa Rica, Panama and Colombia. It is owned and operated by a consortium (https://www.maya-1.com), with Cable & Wireless having the authorisation to land and operate it in Cayman Islands.

13. This system operates in a flat-ring configuration and contains 2 fibre pairs, with the same number believed to be deployed to the Cayman Islands, one FP pointing north to [redacted] and the other FP pointing south to Panama / Columbia.

14. MAYA-1 has undergone multiple upgrades since entering service and it is currently thought the system can support [redacted] Tbit/s per fibre pair. Note this assessment is based on age of system, current technology and upgrades carried out on similar systems, and not on any first-hand knowledge of MAYA-1.

15. As an old, 2000 era system is it likely that the original consortium members signed twenty-five-year terms, meaning there could be in the region of two to three years remaining (of the original agreement). With the number of new (since MAYA-1) and planned cable systems in region it is reasonable to assume that once the initial 25 years commitments have expired, several consortium members may choose not to renew their obligations to MAYA-1. It can therefore be concluded that the commercial viability of MAYA-1 may be under some stress in the near-term.

16. While the pricing of services on the Cayman branch is of utmost importance to the Cayman Islands and its consumers, it is likely that the continued commercial viability of MAYA-1 depends minimally on revenue obtained from Cayman Islands and to a far greater extent on revenue gained from the main trunk parties, notably Costa Rica, Panama and Colombia. In other words, forces external to those on the Cayman Islands may play a greater role in the long-term future of MAYA-1, then internal Cayman demand.

17. [redacted]

18. One further point to consider regarding MAYA-1 is the likely knock-on effect a new (third) cable landing in Cayman Islands would have, should it either reduce the current market pricing or MAYA-1's market share. Either of these would likely further undermine MAYA-1's commercial viability and possibly shorten its remaining lifespan.

19. In short, MAYA-1 should be seen as only a near-term solution and no planning should be undertaken with the assumption that it will continue to be available for use in anything other than the immediate short term.

D. 'Cable Co.' incorporation and project management approach

20. This section considers the management approach that CIG should take to procuring and managing a new subsea cable, including consideration of the advantages and disadvantages of creating a Special Purpose Vehicle (in this OBC, illustratively named 'Cable Co.') to act as Client for the project.

Present Arrangements

21. At present, the Outline Business Case stage of the project, the project is being run by officials of the CIG including the lead department, the Ministry of Planning, Agriculture, Housing and Infrastructure (MPAHI), and the Ministry of Finance. The team is supported by consultants including Grant Thornton and Pioneer Consulting. The following discussion considers how the project could be structured to move to the next stage of the business case process, the Full Business Case.

Project roles

22. In any major infrastructure project, three distinct high-level roles can be conceptualised. These are:

    - **Sponsor**

      The Sponsor of a project takes responsibility for defining the **strategic objectives** and **high-level requirements** of a scheme, and holds **final approval rights** over the funding and assurance of delivery of benefits associated with the project. The Sponsor takes a lead role in project **governance**, and typically **holds the Client to account** for delivery of the scheme within the agreed budget.

    - **Client**

      The Client is responsible for taking the strategic objectives, high-level requirements of a scheme, and available funding, from a sponsor, **assembling a comprehensive statement of requirements**, running a **procurement**, and acting as a **client or customer to the deliverer** by maintaining a close ongoing relationship. The Client is responsible for delivery within the budget set by the Sponsor. The Client is also responsible for due diligence of the Deliverer, working closely with the Sponsor to identify financial, geopolitical and other risks in contracting with interested parties to deliver the scheme.

    - **Deliverer**

      The Deliverer of a scheme is **contracted by a client to deliver the scheme**. The nature of this deliverer would vary depending on whether the scheme being progressed is a 'self-build' scheme, in which case the Deliverer is likely to be a supplier of turn-key subsea cable solutions, or a 'spur' scheme, in which case the Deliverer is likely to be the owner of the third-party cable.

23. It is generally considered best practice to ensure that the individuals or entities who assume each of the three identified roles are different, and that there are clearly defined relationships between the Sponsor and the Client, and between the Client and the Deliverer, and that the role of each party is clearly defined.

24. It would be consistent with best practice for CIG to adopt this structure for delivery of a significant and novel infrastructure project such as the new subsea cable currently under consideration.

25. It is typically inadvisable for the same entity to perform the roles of Sponsor and Client. This is because:

    - separation allows full management attention of the Client to be focused on successful delivery of the project, rather than seeking to manage a complex procurement and project management as part of a wider role that may be exposed to frequent political intervention;
    - separation allows clear division and accountability for funding, with a defined line between those responsible for approving expenditure (Sponsor) and proposing it (Client);
    - separation provides clear lines of accountability for delivery of the project;
    - an SPV provides a standalone vehicle for securing the necessary technical expertise that can work in a small, focused organisation and deploying it in a targeted way.

26. In addition, in relation to the subsea cable project specifically, separation between Client and Sponsor might:

    - provide a sound basis for seeking regulatory approval for the scheme, by making a clear dividing line between the Client and the government; and
    - a separate Client may provide a suitable vehicle for the future commercialisation of the assets and planning of further cable development if required.

The Sponsor

27. It is assumed that CIG, and specifically the Ministry of Planning, Agriculture, Housing and Infrastructure (MPAHI) in its role as lead government department for the subsea cable project, would act as Sponsor to the Client. The Sponsor role should include nominating a single identifiable individual who could also act as Senior Responsible Officer (SRO) for the project on behalf of CIG.

28. In order to ensure appropriate cross-government engagement with relevant other departments including the Ministry of Finance and Economic Development and the Department of Environment, MPAHI and the SRO could develop a Project Sponsor Board, which could meet in on a regular basis to monitor the project and its budget, and hold the Client to account for delivery. The board could be chaired by the SRO of the project. Such a board could potentially represent an evolution of the present project steering group.

29. The initial tasks for the Sponsor would be to:

    - Determine an appropriate legal form for the Client. As the Client is likely in due course to raise revenue from the sale of capacity, this could be a government owned company (similar, for example, to the structure used for Cayman Airways);
    - Establish the legal structure for the Client, agree an operating budget for it and appoint its leadership;
    - Provide office accommodation for the Client. While in order to reduce expenditure it may not be necessary initially to secure a new, separate building, a dedicated ‘Client’ floor or area of an office should be sought, separate from that occupied by the Sponsor;
    - Ensure appropriate governance is in place with the Client — this could constitute a Framework and Funding Agreement, as described below;
    - Determine the high-level project requirements, timescale and project budget and agree these with the Client.; and
    - Establish a regular Project Sponsor Board, and agree agenda and reporting requirements with the Client.

30. The standing agenda of the Project Sponsor Board could include:

    - Receiving regular reporting from the Client on project progress and timelines;

- Consideration of an updated risk register maintained by the Client, and progress in delivering mitigations;
- Monitoring and managing project dependencies and constraints;
- Monitoring the Client's budgetary position and forecasts;
- Monitoring stakeholder and public perception tracking;
- Monitoring work to track the benefits associated with the project; and
- Development and approval of any recommendations to Cabinet.

31. It is likely that once the cable has entered into service, the role of the Sponsor will reduce significantly. However, while the Client organisation endures (which as described below could reasonably be for the entire duration of the lifetime of the new cable), it will be important that a degree of Sponsor capability is maintained to allow effective government oversite of the Client. It may be, though, that regular Project Sponsor Board meeting can be reduced or ended at this point and the relationship become more 'light touch' than during the early procurement and delivery phase.

The Client — Cable Co

32. On the basis of the analysis in the Commercial Case of this OBC, it is assumed that the Client for the project would be a wholly-government-owned special purpose vehicle (SPV), which has been created for the project. The role of the Client would initially be to deliver new subsea cable connectivity in line with the Sponsor's mandate, securing appropriate licences and permits as necessary.
33. Once the cable has been delivered and entered into service, the Client would assume responsibility for the ongoing operation, commercialisation, and maintenance of the asset. The Client organisation would thus be expected to endure for the entire lifetime of the cable.
34. The initial tasks for the Client, once it has been established and leadership appointed, would be to:
    - Ensure that it is appropriately resourced with individuals with relevant expertise;
    - Establish a project delivery plan along with a procurement approach;
    - Agree a regular reporting approach with the Sponsor;
    - Agree with the Sponsor a set of due diligence procedures to be performed when choosing the Deliverer, such as financial standing tests and assessments on ownership; and
35. When approved by the Sponsor (where the Sponsor may require development of a Full Business Case), begin the procurement process as described in Section E of this Management Case. In line with the staffing assumptions made in the Financial Case of this OBC, the long-term staffing requirements of the Client organisation (i.e. once the cable has been delivered and is in service) might reasonably comprise the following roles, employed on a part-time (0.5 FTE) basis:
    - One Managing Director
    - One Sales Director
    - One employee in Commercial and Contracting
    - Two employees in Sales
    - One Chief Technology Officer
    - One Engineer
    - One Accountant
    - One Legal Advisor, and
    - One Administrator.

36. These requirements will vary during the initial procurement phase of the project, where additional procurement or technical expertise will certainly be required. This is likely to include the following short-term staff for the duration of the build:

    - One project director, responsible for running the build, managing suppliers and ensuring delivery of other deliverables including buildings, backhaul and permits;
    - One technical lead, responsible for the technical specification, ensuring that the supplier delivers the agreed scope within budget, and advising on technical aspects of other deliverables;
    - One marine lead, responsible for overseeing marine operations; and
    - One permit lead, responsible for securing the necessary permits and licences from the regulator and other authorities.

37. Depending on the legal structure selected, the Client organisation might be required to have a board of directors. Such a board would typically be comprised of senior members of its staff (e.g. its Managing Director, Sales Director and Chief Technology Officer), and could be complemented by some non-executive directors, who could be selected to introduce technical or commercial expertise and challenge to board-level decisions, and to ensure good governance of the SPV.

Role of the Managing Director of Cable Co

38. The responsibilities of the Managing Director of Cable Co might include the following:

    Lead corporate strategy and strategic planning

    - Establish, resource, and lead a new government-owned company to deliver and manage new subsea connectivity for the Cayman Islands. Recruit, lead, manage and develop a team to resource all activity.
    - Over the medium term, successfully and sensitively manage the company's transition from designing and delivering solutions to day-to-day management of the new infrastructure.
    - Work closely with board members and the company's sponsors in government to agree appropriate terms of reference, governance arrangements, processes and procedures, reporting, and a business plan
    - Work closely with the government to develop the business case for a final investment decision in the Cayman Islands' infrastructure
    - Implement an appropriate approach to the identification, management, and reporting of risks
    - Develop and manage business continuity (/disaster recovery) and cyber response plans

    Lead commercial strategy

    - Lead development implementation of the new company's commercial strategy, to deliver the government's ambitions for Cayman Islands' connectivity
    - Optimise the company's pricing strategy in line with the government's ambitions
    - Monitor market conditions and competitors to ensure the commercial strategy remains relevant and optimised
    - Secure agreements with remote landing parties as required
    - Identify and develop new ideas for additional revenue over the short, medium and long term
    - Define wholesale products and associated materials (collateral, contracts, terms and conditions, prices, billing, service levels and credits)
    - Develop and implement sales strategy, processes and resources

    Lead operations

    - Develop and implement the company's operational strategy
    - Manage in-life operation of cable, landing stations and services:

- Develop and implement processes and activities to test, provide, cease, monitor, manage and report on the capacity products for customers
- Preventative maintenance activities: daily/weekly/monthly/annual checks and actions (e.g. regular generator testing and servicing, annual shore end dive surveys etc)
- Oversight of landing party agreements, performance and future development
- Management of spares (e.g. likely to have [redacted] of spare cable, repeaters etc normally stored with cable repair ship)
- Management of Marine Maintenance agreement (repair ship) and management of any repair activities (cable break) – fault location, liaison with ship etc
- Undertake repairs e.g. replacement of failed components (mainly in cable landing stations)
- Liaise with third party system operators (i.e. where there is a branch arrangement) and participate in system management meetings
- Liaise with the NAP
- Overall, ensure optimum reliability consistent with critical national infrastructure

- Lead development of the company's marketing and communications strategy

Build and manage corporate relationships

- Build strong, trusting relationships with a wide range of stakeholders across the Cayman Islands and internationally, including with the government, regulator, customers, and business groups.
- Lead regular industry consultation and engagement to ensure business strategy alignment with customers' demands
- Manage relationship with system vendors for support and ensure any issues are resolved (eg. under warranty)

Culture, processes and people

- Own and develop a positive and high-performance organisational culture
- Establish and implement high quality financial processes including budget setting/tracking/reporting, audit, billing, supplier management
- Develop and implement HR policies and processes
- Develop and operate a quality plan and seek out innovations and optimisations to continuously improve performance

39. The skills and competencies required of the Managing Director of Cable Co might include:

- 10+ years leadership experience in a telecommunications company
- Strong analytical and commercial skills, in parallel with a strategic yet action-oriented mindset
- High-energy and sense of urgency
- Excellent oral and written communication skills with an ability to build trusting and open relationships with a wide range of stakeholders
- Team player with an outstanding ability to recruit, inspire and lead a high-performing team
- Degree-level education, MBA as an asset
- Ability to relocate to the Cayman Islands (if not already resident)

Relationship between the Sponsor and the Client

40. It is best practice for the relationship between the Sponsor (in this case, MPAHI, as described above) and the Client (in this case, a newly created Cable Co) to be codified so that there is a

mutual understanding of roles and responsibilities on both sides, and to help to minimise the possibility that critical activities will 'fall between the gaps' of the two organisations.

41. This relationship could be codified in a 'Framework and Funding Agreement' (FFA), which should be accepted by both parties. This document could evolve and iterate over time (noting the anticipated long duration of the existence of the Client), allowing provision for it to be improved and corrected, if necessary, in light of emerging circumstances, but would mean that at any given point of time there is clarity about roles and responsibilities.

42. The areas initially covered by the FFA could include, non-exhaustively, those set out in the table below.

Table 1: overview of areas covered by the FFA

Topic	Commentary
Purpose of Cable Co	The high-level responsibilities and nature of Cable Co, and the reason for its creation, should be set out.
Relationship between Cable Co and Sponsor	Clarity on the way the relationship between the organisations should be conducted ('open, honest'). Clarity on who the lead individuals on each side are.
Responsibilities of each organisation	A breakdown of responsibilities between each organisation relating to the project should be recorded. This could include the terms of reference of a Sponsor Board, and a requirement to attend.
Responsibilities of the Board and Chair of Cable Co	Sets out the Sponsor's expectations of the Board and Chair of Cable Co.
Governance and accountability	Requirements about the keeping of accounts and financial records, and audit. Requirements around Client board appointments.
Risk management	Clarity on responsibilities with regard to risk management between the organisations.
Financial management	Requirements for the Client's corporate and business plans. Requirements for approvals required from the Sponsor for the Client to spend money. Requirements around Client insurance.
Staff and resourcing	Requirements on the Client around staff, resourcing, headcount and pay.

43. A summary of the high-level project management approach proposed by this OBC is set out in Figure 1.

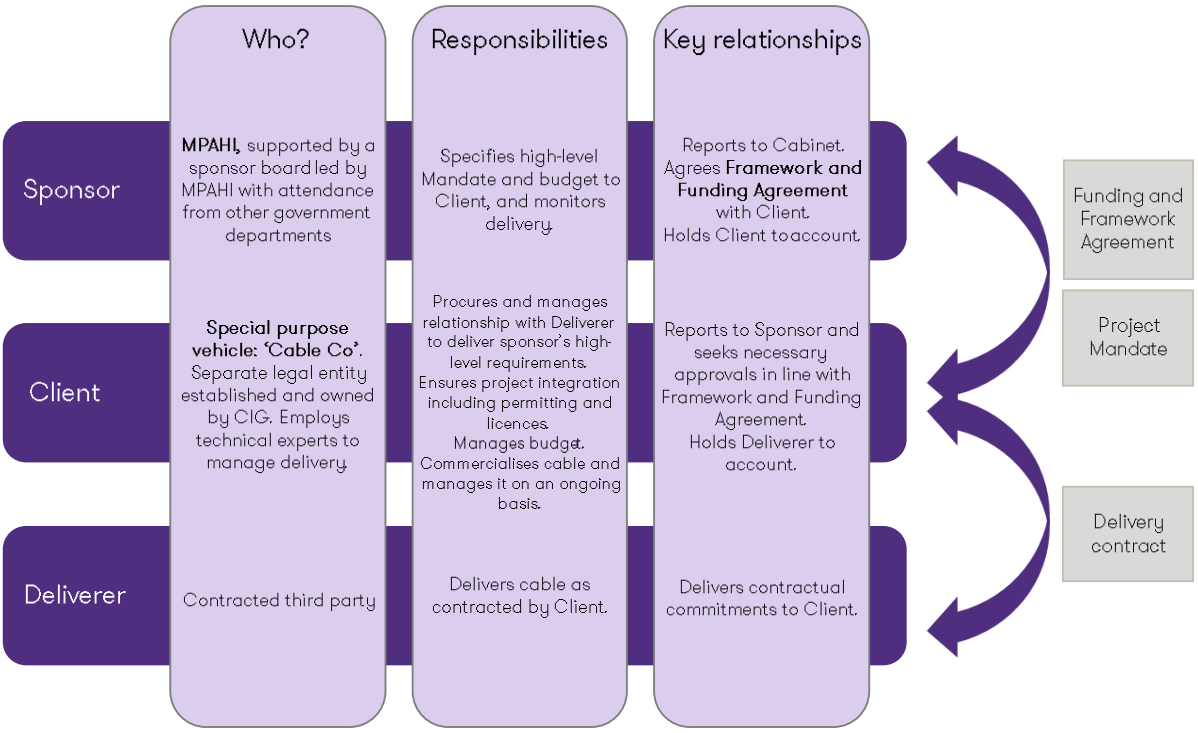


Figure 1: roles of sponsor, client, and deliverer

E. Project timeline

44. This section aims to outline the durations required to implement the various short-listed solutions identified by the Strategic Case. While there are a number of potential solutions being evaluated, in general they fall into one of two categories i.e. either self-build, and build from a branch of a planned, future cable.

45. In the case of a self-build option, while the durations of some elements that comprise the overall program will directly vary dependent upon the length of the system i.e. Marine Survey duration or wet plant manufacture etc, in general, it is reasonable to say that these items will not be on the critical path for system deployment.

46. In the case of a planned cable in the region, which Cayman Islands is looking to secure a branch from, then in addition to the myriad of components comprising the system Plan of Work (POW), there is the requirement to accept the risk that any branch to the Cayman Islands will be wholly dependent upon the cable system owners successfully completing their project.

47. If we assume that the financial means, willingness, and executive sponsorship to proceed are in place, then the key tasks required to be completed can be summarised as follows for a self-build solution:

- **Step 1: Procurement.** What system does the Client require? The answer to this is a *Technical Specification* and an accompanying set of *Commercial Terms & Conditions (T&Cs)*. The Client would need to develop these documents in light of the high-level requirements put in place by the Sponsor, CIG, in the Project Mandate. These documents would be released to the market in the form of a *Request for Quotations (RFQ)* allowing qualified, potential suppliers to respond.

  For the [redacted] self-build option, a period of no less than 6 months should be allocated to conclude the Procurement phase. In parallel with this phase Cable Co should also engage with the market (including other government bodies in any relevant jurisdictions) to identify any other revenue opportunities for its new cable, outside of Cayman Islands and secure the basis for these to be leveraged in financing the project.

At the completion of this phase the Client should be in a position (i.e. with a fully agreed Technical Specification and negotiated contractual T&Cs), to sign ("Contract in Force") with a suitable vendor.

- **Step 2: Implementation.** For any self-build option, the preferred mode of contracting with a supplier would be full turnkey. In this context turnkey means the supplier would be responsible for the marine route survey, wet plant manufacture, system, integration, installation and commissioning, with the purchaser's responsibilities limited to a portion of the permitting, seabed lease and land-based infrastructure i.e. Cable Landing Station preparation.

  The main drivers to the length of this phase are likely to be outside Cable Co's direct control and will be dictated by vessel availability (both Survey and Installation, wet plant manufacture capacity and permitting). Commencing immediately following Phase 1 – i.e. at Contract in Force (CIF) – this phase would realistically be expected to last 24 to 36 months.

48. Looking at solutions involving a branch from a third party cable:

    - **Step 1: The Procurement**. This phase should be shorter (than self-build), as there is no choice to make about which vendor, as this will have been chosen by the system owner. Likewise, there will be limited scope for technical variations, again as the overall system design will have been largely fixed by the system owner. Duration of this phase will be solely down to the ability of the Client and the system owner to come to a mutually agreeable position and sign a contract. The nature of an optimal deal with a cable developer for providing a spur could be quite bespoke to each situation to ensure the best infrastructure solution, factor in any advantages to the cable developer of providing the spur and potentially involve third parties who's proposals may have synergy with infrastructure to support the Cayman Islands. It would be the role of the Cable Co to ensure that an optimal deal is struck.
    - **Step 2: Implementation.** For all of this type of solution the deployment of a branch to Cayman Islands will be wholly dependent upon the larger system build POW. While the dedicated Cayman branch may only potentially be a few hundreds of kilometres long, its implementation will be driven by a third party – i.e. the System owner. This approach also raises additional issues dependent upon the status of the larger system build such as:
        - who will conduct (and when) the marine route survey? Some of the planned regional systems have already conducted their Marine Survey, which would require a dedicated mobilisation on the part of the Cayman's branch.
        - Will CIG be in a position to provide the required commitments in line with the needs of system owner?

49. Without further details from possible third-party cables, at this time it is not possible to provide any accurate estimates on deployment timescales. Considered at a high level, it seems reasonable to characterise spur options as being potentially faster than self-build options to reach the point at which they are ready for service, but carry more uncertainty as to whether this will be the case or indeed whether any particular option will ever reach this stage. Further, spur options are potentially vulnerable to commercial risks outside CIG's control which could delay the project.
50. The Programme of Work set out in the Financial Case of this OBC shows typical durations for Phases 1 and 2 for a self-build option.
51. An overview of the proposed initial timeline, incorporating development of the Client organisation and procurement of a third-party cable is set out in the table below.

Table 2: Overview of the proposed initial timeline

#	Action	Suggested Timescale
1	CIG establishes and staffs a government-owned 'Cable Co' to act as Client for the project.	Immediately following Cabinet decision to proceed. Staff appointed by Winter 2022.
2	CIG develops a Mandate for Cable Co on basis of information set out in this Outline Business Case, setting out its preferred approach for delivery of connectivity.	Simultaneously with establishing Cable Co — i.e. immediately following Cabinet decision to proceed. Mandate provided to Cable Co as soon as Cable Co fully established.

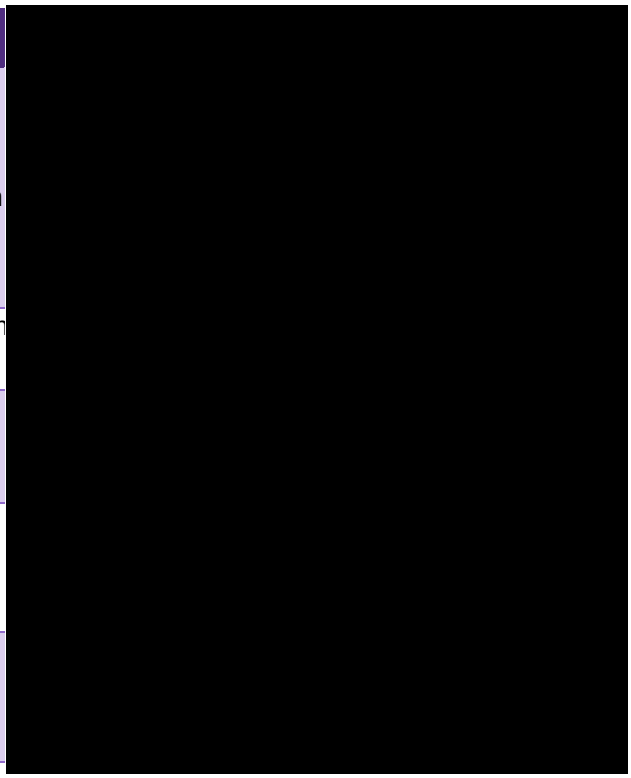
52. The benefits of establishing a Client organisation that is separate from CIG to run the entire project, from procurement through to in-life management, include:

- **Flexibility**: to work through the complexities in delivery of the subsea cable, the Client will offer flexibility and agility at the pace of the private sector. Such flexibility may be more difficult to achieve within government.
- **Experience**: the process of determining the right options, developing and negotiating key contracts, and working alongside expert lawyers, technical advisors and suppliers builds valuable experience for the parties involved. Such experience, if gained from within government, could be lost in transition to the Client if a Client organisation is only established at a later stage.
- **Relationships:** continuity of relationships will support the ability to establish, maintain and leverage relationships other parties, such as cable system vendors, NAP operators, landing parties, and service providers.
- **Industry model:** most cable vendors are used to dealing with the same entity during design, procurement, build and operation of the subsea cable. Splitting up this structure could cause some confusion and disruption.

53. From this point, the nature of the timeline will vary depending on whether a self-build or spur option is preferred. If a **self-build option** is preferred, subsequent steps are set out in the following table.

Table 3: overview of subsequent steps if a self-build option is preferred

#	Action
3a	Cable Co develops a Technical Specification and Commercial Terms and Conditions in light of CIG's project Mandate. These documents are released to the market as an RFQ. Remote landing party sought.
4a	Preferred provider selected, Technical Specification and Commercial Terms agreed
5a	CIG approval for contract gained, along with Full Business Case developed by Cable Co setting out commercial strategy
6a	Delivery begins. Cable Co work to deliver commercial offer (e.g. creating products, selling services) begins
7a	Entry into service.



54. If a spur option is preferred, subsequent steps are set out in the following table.

Table 4: overview of subsequent steps if spur option is preferred

#	Action	Suggested Timescale
3b	Cable Co enters into discussion with potential third-party providers to seek to secure infrastructure that will deliver CIG's mandate.	Immediately following Cable Co establishment.
4b	CIG approval for contract gained, along with Full Business Case developed by Cable Co setting out commercial strategy.	Entirely depends on progress of discussions with third-party, and their project timelines.
5b	Delivery begins. Cable Co work to deliver commercial offer (e.g. creating products, selling services) begins.	Following contract signature in line with wider project timelines.
6b	Entry into service.	Dependent on third-party timescales.

Options for acceleration

55. If CIG wished to move faster than the timescale suggested above, it may be possible for early stages of the project to be run concurrently, so that the formal establishment and staffing of Cable Co does not delay delivery of the project. One approach to doing this could be for CIG to begin work on the project, and to hand over the work to a Cable Co once it has been established. There are, however, risks to this approach:

- **Flexibility:** CIG may find it challenging to operate with the agility and pace necessary to negotiate with multiple third-party cable providers simultaneously.

- **Experience:** A newly established Cable Co may not benefit from the experience of options identification, procurement and contract negotiation relating to the cable that it is asked to manage. This could result in exploitation from counterparties, as separation of build and operation risks leaving the Client with insufficient expertise to develop and refine the best strategy and optimum trade-offs.
- **Relationships:** Introducing a discontinuity with a transition from government to the Client may make it much harder to maintain and leverage relationships with other parties.
- **Industry model:** A disjointed approach would not conform to the typical industry approach.

56. One approach that could help to minimise the disadvantages of the discontinuity above and allow CIG to benefit from an accelerated timescale is through establishment of a **'Shadow Cable Co'**.

57. A 'Shadow Cable Co' would be a team wholly established within CIG early in the project that would seek to act like the future Cable Co as far as possible, while a formal Cable Co entity was being established and staffed. However, the Shadow Cable Co would not have any separate legal status from CIG, and would be staffed by government officials or contractors rather than appointed staff. Shadow Cable Co would, in due course, transition into being Cable Co and would plan to do so – for example by providing for novation of any contracts to the new entity.

58. The table below suggests an accelerated timescale using a 'Shadow Cable Co' model, that could accelerate the project's timescale while preserving as far as possible the advantages of a separate Client organisation.

Table 5: suggested accelerated timescale using a 'Shadow Cable Co' model

#	Action
1	Shadow Cable Co team established within CIG and staffed by government officials and consultants/contractors.
2	Work begins to establish Cable Co formally as a separate legal entity and plan a transition from Shadow Cable Co to Cable Co.
3	CIG develops a Mandate for Shadow Cable Co on basis of information set out in this Outline Business Case, setting out its preferred approach for delivery of connectivity.
4	**For a self build:** Shadow Cable Co develops a Technical Specification and Commercial Terms and Conditions in light of CIG's project Mandate. These documents are released to the market as an RFQ. Remote landing party sought.
5	**For a spur:** Shadow Cable Co enters into discussion with potential third-party providers to seek to secure infrastructure that will deliver CIG's mandate.
6	Shadow Cable Co transitions into Cable Co.

[redacted]

59. From this point onwards, the timescales would be as those described above.

F. Permit Feasibility Study

60. This section aims to describe the regulatory framework underpinning the permit application process for a new cable system landing in the Cayman Islands. After finance, permitting can pose the greatest risk to a new cable system that can affect schedule and costs, and would therefore be a principal activity for the Client to ensure was on track.

61. This section is supplemented by a Permit Tracking Matrix and Plan of Work, which are annexed to this OBC as Annexes B and A respectively.

International Law - UNCLOS

62. The laying of cables (and pipelines) is one of the freedoms of the High Seas under the United Nations Convention on the Law of the Sea (UNCLOS), an international agreement signed in 1982 and which came into force in 1994. Amongst many other provisions, UNCLOS provides the freedom to lay, maintain and repair cables on and off the continental shelf and places obligations on owners of new cables to indemnify repair costs for any damage caused to existing cables/pipelines. With respect to submarine cables, the main articles of UNCLOS to be taken into account are:

    - ***Article 58***: In the Exclusive Economic Zone (EEZ), all States enjoy the freedom of laying of submarine cables (subject to the relevant provisions of this Convention).
    - ***Article 79***: (i) All States are entitled to lay submarine cables on the continental shelf, in accordance with the provisions of this Convention. (ii) Coastal States have the right to take reasonable measures for the exploration and exploitation of the continental shelf, as well as for the prevention, reduction and monitoring of pollution. However, they may not impede the laying or maintenance of cables. (iii) The delineation of the cable route on the continental shelf is subjected to the consent of the coastal State. (iv) The coastal State has the right to establish conditions for cables entering its territory or territorial sea. (v) All States should take into consideration other cables and pipelines already existing when planning the laying of a new cable, so that the possibility to repair the existing infrastructures is not prevented.
    - ***Article 87***: All States have the freedom to lay submarine cables in the high seas, subject to Part IV of this Convention. This freedom shall be exercised with due regard for rights under this Convention with respect to activities in the area.
    - ***Article 112***: All States are entitled to lay submarine cables on the bed of high seas beyond the continental shelf.
    - ***Article 113***: The breaking or injury of submarine cables and pipelines, done deliberately or through culpable negligence, beneath the high seas shall be a punishable offence. To this aim, every State shall adopt necessary laws and regulations when the injury is done by a ship flying its flag or a person subject to its jurisdiction. This provision shall not apply in case the break or injury has been caused with the merely objective of saving their lives or their ships, after the necessary precautions have been taken.
    - ***Article 114***: If the owners of a submarine cable or pipeline cause a break or injury to another cable or pipeline, they have to bear the costs of the repairs. To this aim, every State shall apply the opportune laws and regulations to person subject to its jurisdiction.
    - ***Article 115***: In case that the owners of a ship have sacrificed an anchor, a net or any other fishing gear to avoid injuring a submarine cable and can prove it, they shall be indemnified by the owner of the cable. To this aim, every State shall apply the opportune laws and regulations to ensure this compensation.

63. While Cayman Islands, as a coastal state, may not impede the laying of subsea telecommunication cables, or prevent their ongoing maintenance, it may take reasonable measures to prevent, reduce and control any associated pollution event. It is also still a requirement that the actual route, or delineation, of a proposed subsea telecommunication cable be approved by the appropriate authorities within the Cayman continental shelf, and these permissions can include standard conditions.

Maritime Delimitations

64. According to UNCLOS, each Coastal State may claim the waters within 12 nautical miles (NM) of its baseline as a Territorial Sea (***article 3***). Foreign vessels are allowed innocent passage through the territorial sea. Furthermore, Coastal States may lay claim to natural resources and certain economic activities within an Exclusive Economic Zone (EEZ), which (nominally) extends 200 NM from its baseline (as determined from the mean low-water mark) (***article 57***). In the EEZ, Coastal States exercise jurisdiction over marine science research and environmental protection. All other States can navigate and overflight in the EEZ, as well as lay submarine cables and pipelines (***article 58***).

65. The UK extended the ratification of UNCLOS to Cayman Islands (as a British Overseas Territory) which was signed in 1998 and in 2003. The Cayman Islands have an established 12-NM territorial sea and a 200-NM EEZ in the Caribbean Sea as shown in Figure 2.

66. Maritime boundary delimitation issues arise when the maritime zones of neighboring States overlap. Cayman Islands share its maritime boundaries with Honduras, Cuba and Jamaica, with a joint regime area with Honduras. A summary of maritime limits and boundaries of Cayman Islands is shown in Figure 2.

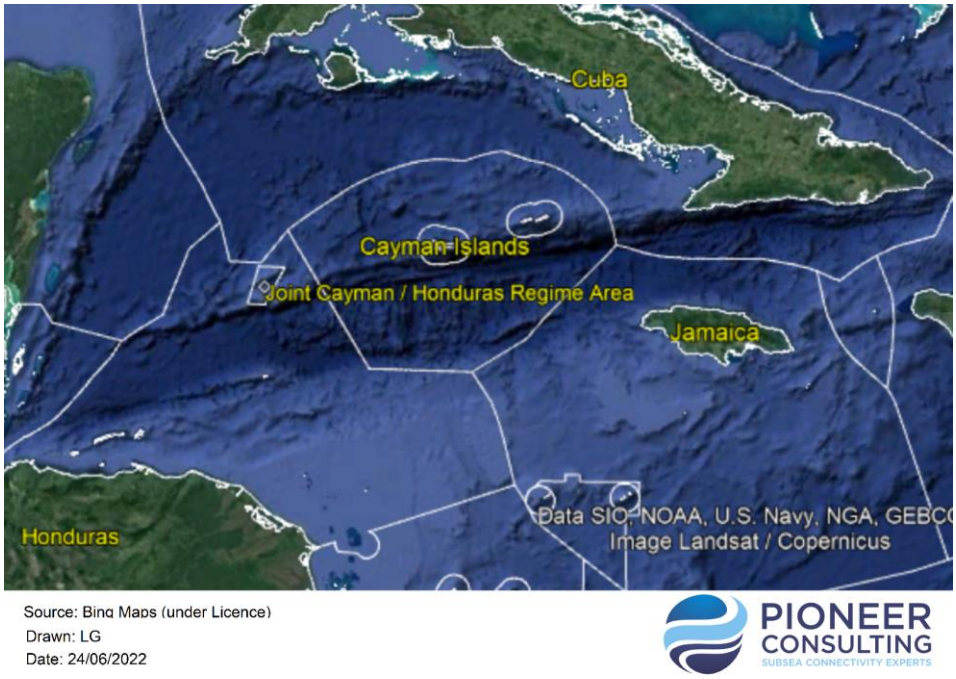


Figure 2: Cayman Islands Territorial Waters and Exclusive Economic Zones of surrounding countries in the Caribbean Sea.

Cayman Islands Policy and Legislative Framework

67. Planning permission will be required for land-based development landward of the Mean High Water Mark (MHWM) pursuant to regulation 13(1) of the Development and Planning Law (2021 Revision).

68. Offshore work seaward of the MHWM will fall under the Coastal Work Permit (CWP) process. The purpose of the permit is two-fold: it grants permission by the Ministry of Sustainability & Climate Change to utilise Crown property and thereby avoids trespass issues; and, it satisfies section 21 of the National Conservation Law (2013).

69. The development will be required to consider the Cayman Islands National Climate Change Policy (2011), which calls for adaptation and mitigation measures to address potential impacts of climate change.

70. In terms of international conservation treaties, the Cayman Islands are a Party to three Conventions that should be taken into consideration in any environmental assessment: specifically, the Convention on Wetlands of International Importance (RAMSAR Convention), the Convention on Biological Diversity, and the Convention on the Conservation of Migratory Species of Wild Animals (referred to as the CMS or Bonn Convention).

Environmental Sensitivities

71. The Cayman Islands are surrounded by reef (as shown in Figure 3) and it is an offence under Section 34 (h) of the National Conservation Law (2013) to directly or indirectly damage any underwater coral or plant growth.

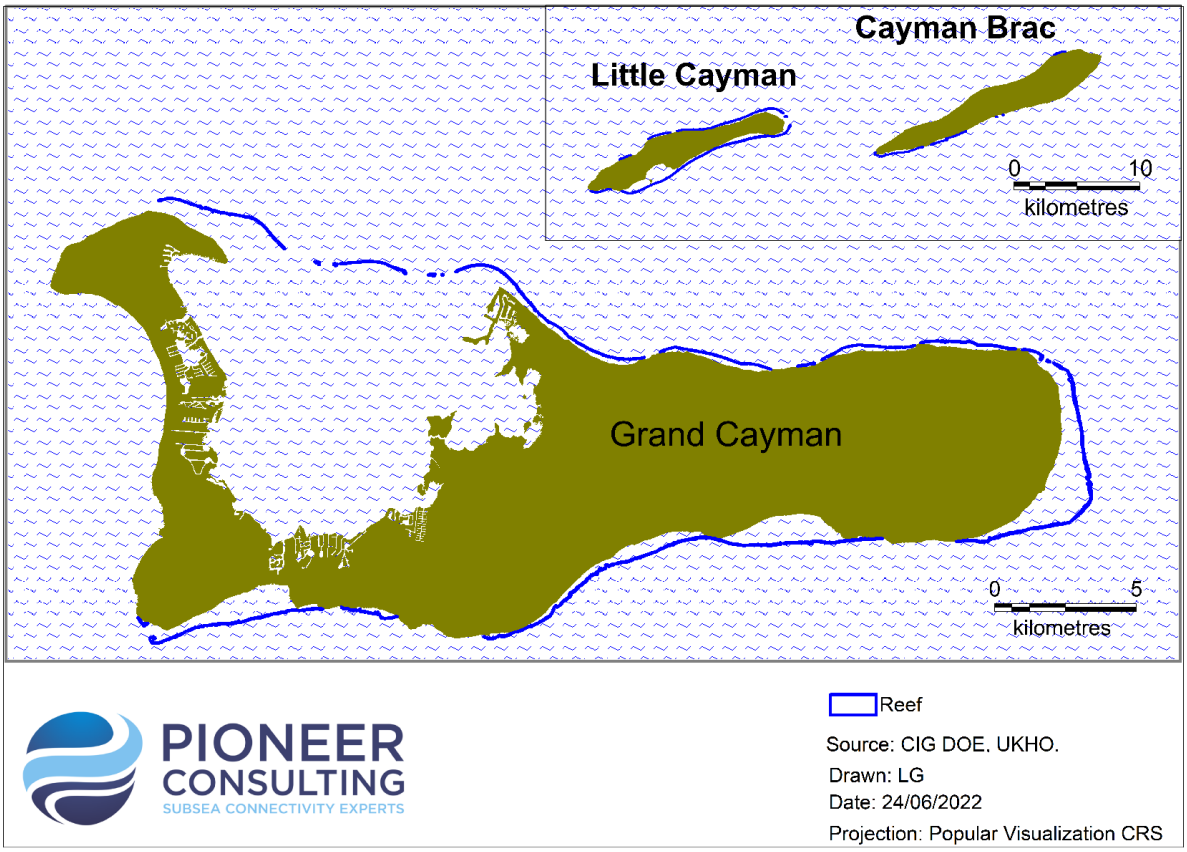


Figure 3: Surrounding reef habitat around the Cayman Islands.

72. The cable route should be designed to “snake” through these important habitats so avoid the most important species and therefore it is likely that a nearshore dive survey of the route will be required. This ecological dive survey should be within the 20-25m water depth in order to create a detailed habitat map to ensure the cable is installed avoiding damage to the benthic environment.

73. Cayman’s Marine Parks systems are regulated under the NCL and different marine elements form these protected areas and are shown in Figure 4 - Figure 7. Although cables are not prohibited from these protected areas, in accordance with Section 21(2) of the NCL, a new cable will be subject to the outcome of an environmental assessment. This will include an assessment of compatibility with the management plan for the area with potential enforceable conditions, and a mitigation fee will be required.

74. Also shown in Figure 4 is an Environmental Zone designated in Grand Cayman. In-water activities (like cable installation) and anchoring are prohibited in this area.

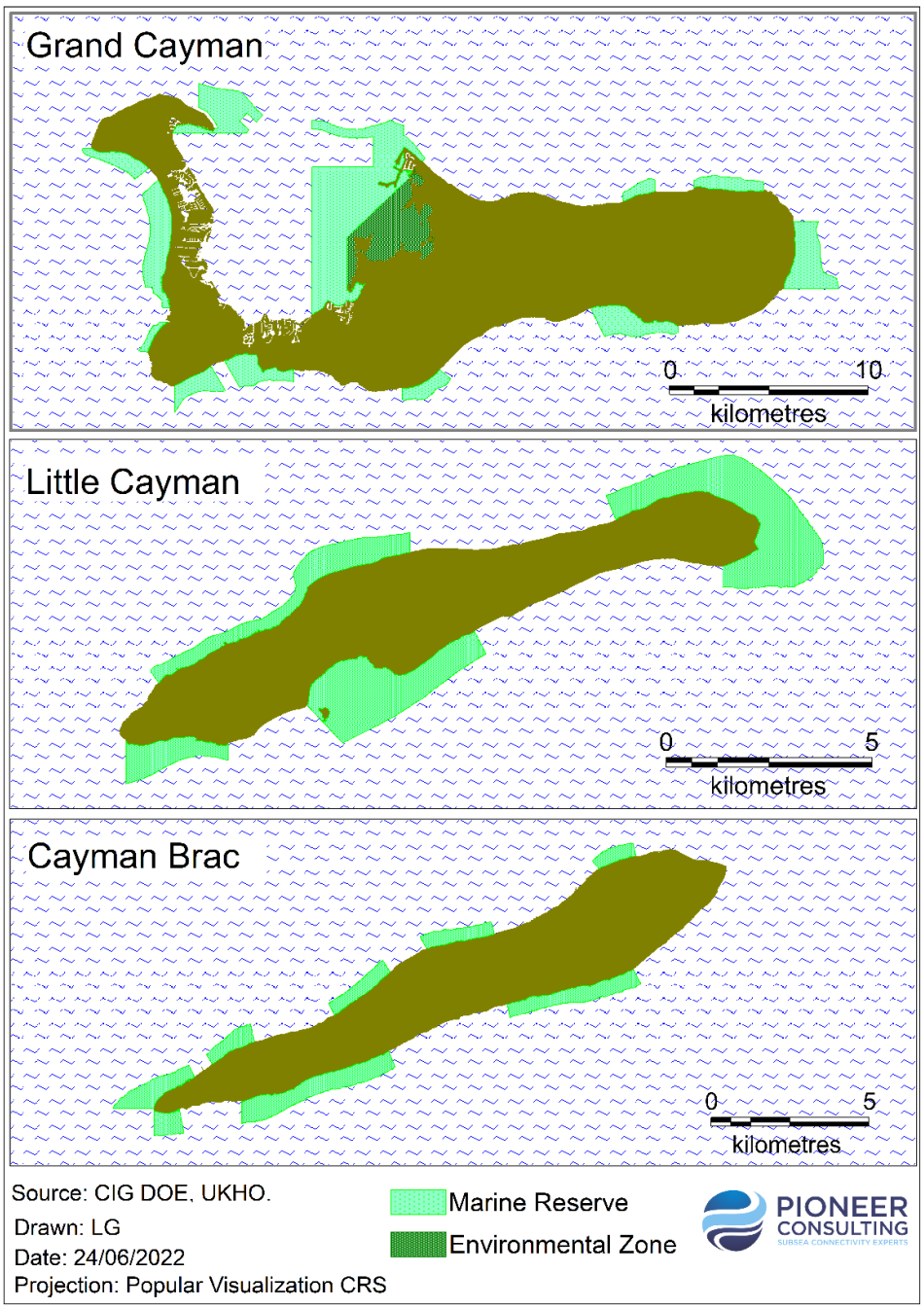


Figure 4: Marine Reserves and Environmental Zones around Cayman Islands.

75. All ceteceans and turtles are protected throughout the year under Section 15 of the National Conservation Law (2013) Schedule 1, Part 1. As such there may be limitations to using acoustic survey equipment for the Marine Route Survey (this survey determines the route and burial details and is a prerequisite to installation). Furthermore, turtle nesting beaches will pose schedule restrictions to cable installation from 1st May through 1st October.

76. Fish spawning aggregation areas are shown in Figure 5 and form part of the wider Marine Parks protected areas regulated under the NCL. Between 1 December to 30 April, anchoring and in-water activities between the 50 foot and 200 foot depth contours are prohibited. An environmental assessment would be required to demonstrate no significant effects to these areas from the cable activities. Also shown in Figure 5 is a Wildlife Interaction Zone designated in Grand Cayman. Anchoring in this area is prohibited within the 3ft depth water depth, or within 20ft of reef.

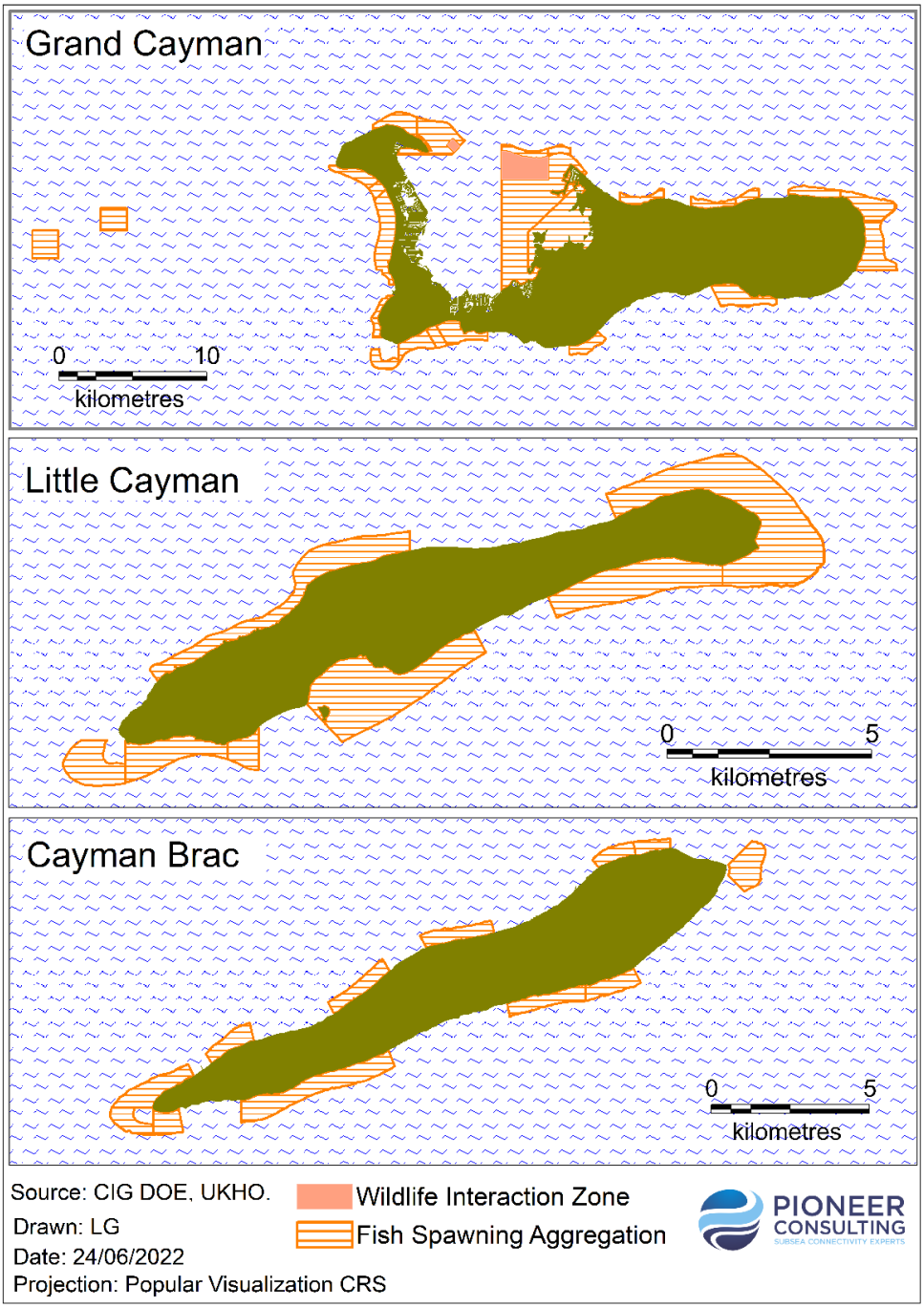


Figure 5: Fish Spawning Aggregation areas and Wildlife Interaction Zone around the Cayman Islands.

Potential Restrictions to Cable Installation

77. Diving is prohibited in certain locations across all three islands, as shown in Figure 6. Divers are usually deployed for nearshore cable installation where the cable ship and plough cannot install. These diving restrictions form part of the wider Marine Parks protected areas regulated under the NCL, and as such, will be subject to environmental assessment.

78. Fishing is restricted to certain areas in order to control activities and conserve natural stocks regulated under the NCL. These Line Fishing Zones are located in all three islands, and an additional two Shoreline Fishing Zones are designated in Grand Cayman (as shown in Figure 6).

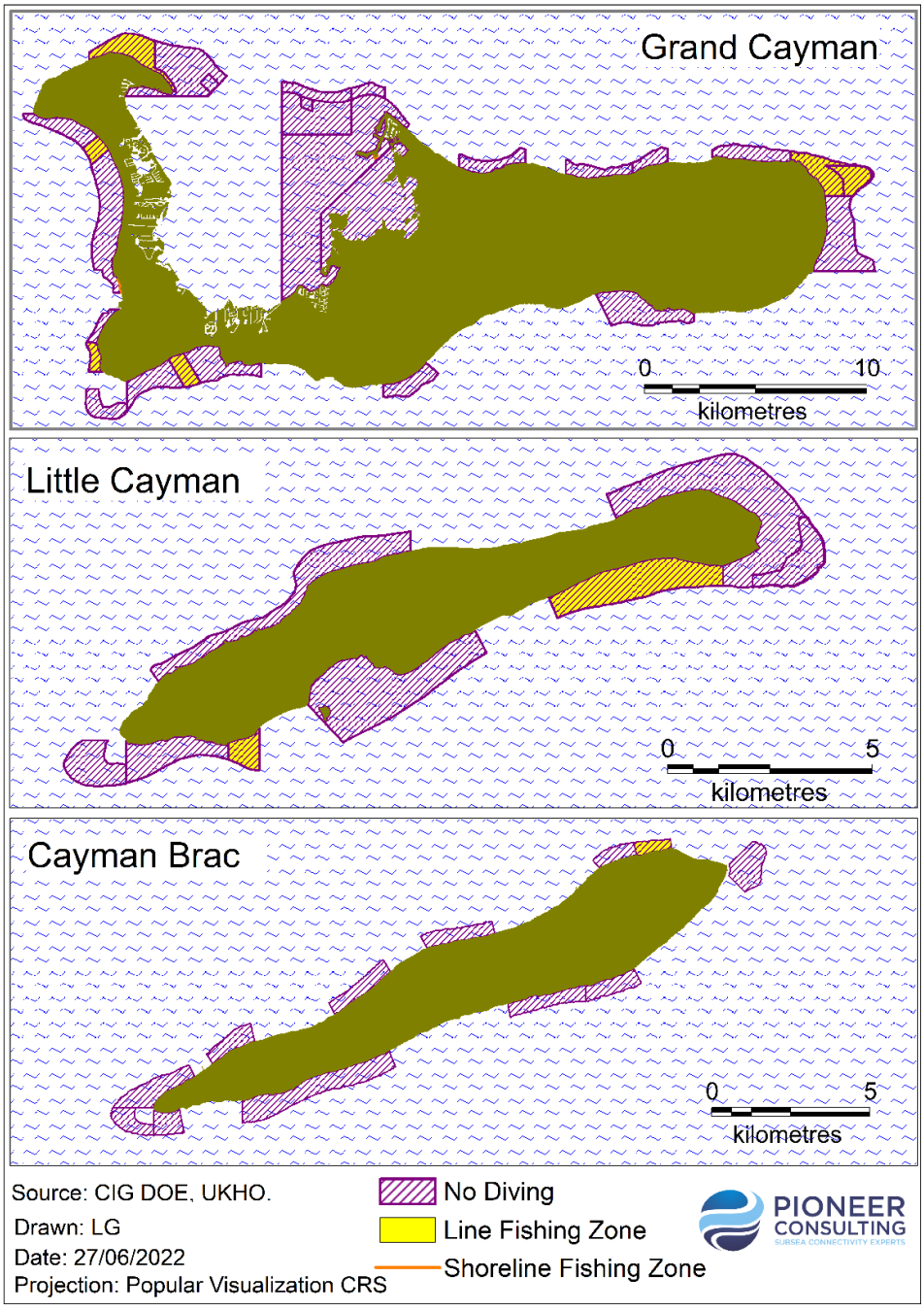


Figure 6: No diving and fishing zones to consider during cable installation activities.

Other Seabed Users

79. Threats to the cable from other seabed users include direct strikes from fishing and anchoring. Trawl and dredge fishing are not carried out around the Cayman Islands so there is no risk to the asset from this source. Designated anchorage areas are located in Grand Cayman and Cayman Brac (Figure 7), where it is Port Authority Controlled. Landing cables in these areas are not advised given the risk to the asset.

80. Recreational boating is a popular pastime in Cayman Islands with commonly used water-skiing and watersports areas (detailed in the Port Authority's Boating Safety document, provided at Annex C). There are also a number of Public Moorings that require to be avoided (Figure 7), or where this is not possible, re-located temporarily subject to relevant approvals.

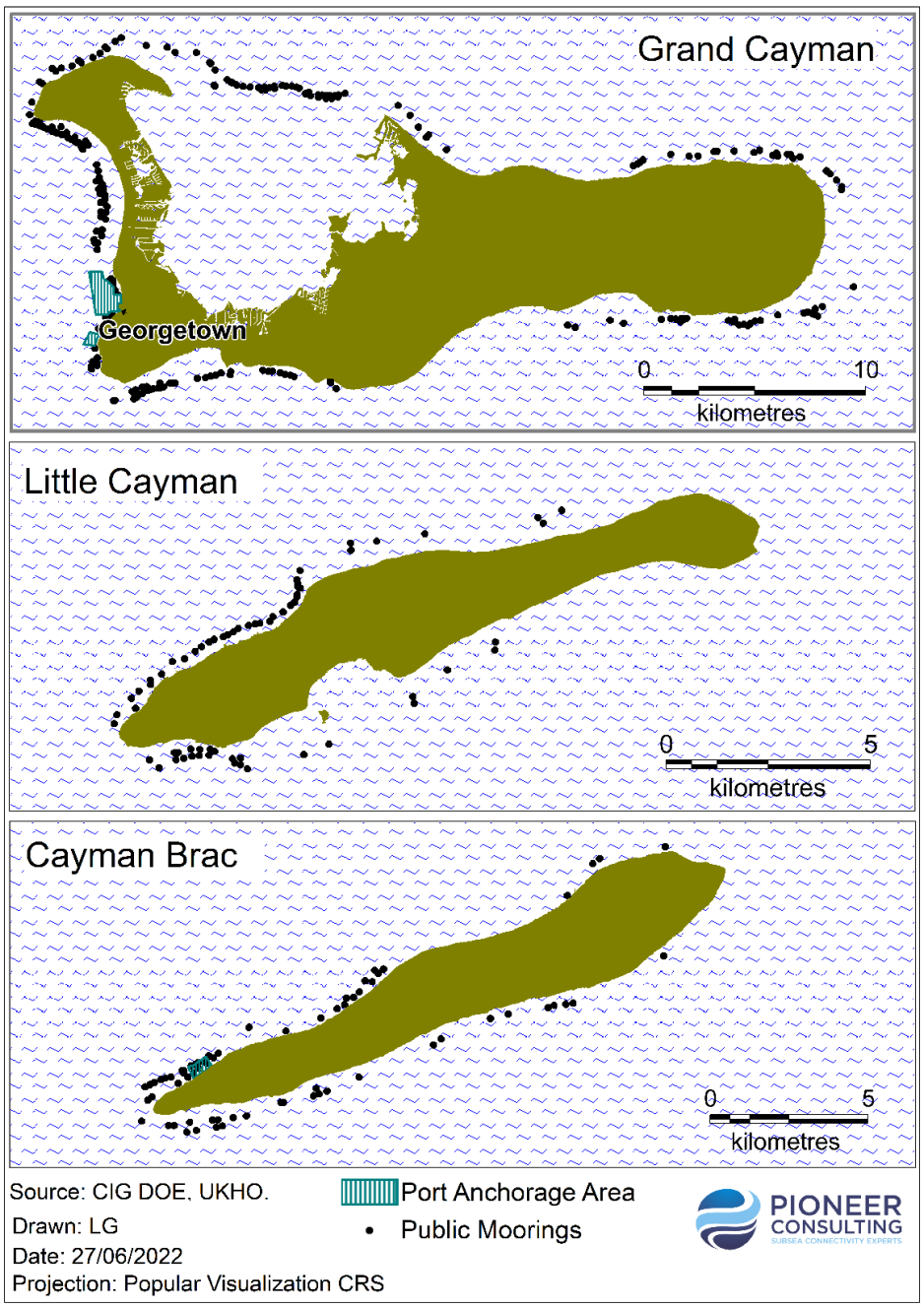


Figure 7: Port anchorage areas and Public Moorings around Cayman Islands.

81. Although survey and installation are temporary in nature and small in footprint, liaison with the fishing community would be necessary to avoid any disturbance and displacement effects.

82. Other infrastructure planned that could introduce a spatial conflict include an Ocean Thermal Energy Conversion (OTEC) floating platform off the north shore of Grand Cayman. Other developments planned are so far restricted to harbour expansions - areas that are unlikely to be suitable for landing a cable.

Environmental Impact Assessment (EIA) Process

83. Telecommunication cables are a listed activity in Schedule 1 of the National Conservation Council Directive for Environmental Impact Assessments Section 43, National Conservation Law (found

online[1]), therefore an EIA process must be undertaken. Given this certainty, a screening process with Department of Environment (DoE) is not required.

84. As detailed in the Plan of Work (POW) provided at Annex A, the EIA process in Cayman Islands is estimated to take 14 months up to submission of the Coastal Works Permit, the approval process of which can then take an additional 6 months for permit issuance.

85. The EIA process is initiated by a Scoping process, and the end result of this is a Terms of Reference report. The project proponent submits a written request for a Scoping Opinion to the Environmental Assessment Board (chaired by DoE). The request should be accompanied by a Scoping Report detailing the following:

    a) A plan sufficient to identify the location of development;

    b) A full description of the nature and purpose of the development and its possible effects on the environment, and

    c) Any other information that the proponent may wish to provide.

86. All issues from Schedule 1 of the EIA Directive should be properly addressed in the Scoping Report which should be prepared by a suitably qualified environmental consultant. This consultant does not necessarily have to be the same consultant employed to carry out the final EIA Report, but at least they should be a likely candidate as information efficiencies can be realised between the reporting. The average cost for a Scoping Report is around $30 - $60k USD.

87. The Environmental Assessment Board (EAB) then confirms the issues to be addressed through the issuance of the Scoping Opinion within 4 weeks of receipt of a request (providing all information has been provided). The opinion will identify those environmental impacts which will likely be significant and which will need to be addressed as part of the EIA. The Scoping Opinion will also indicate the range of technical competencies which the consultants selected to carry out the EIA will need to possess (which will be dependent upon the scale and complexity of the proposed project and associated EIA).

88. The proponent must submit to the EAB details of up to three consultancy firms/teams which possess the technical capacity to undertake the EIA, based on the Scoping Opinion. The EAB reviews and confirms whether the proposed team(s) meet the competency requirements to carry out the EIA. If details of more than one consultancy team are provided to the EAB for review, and all teams meet the competency requirements, the selection of the preferred consultant can be made by the proponent. Should the EAB determine that the consultancy team(s) do not meet the basic competency requirements, the proponent will have to engage further with consultancy teams until a suitable team is identified.

89. The proponent's appointed consultancy team, in collaboration with the EAB, will develop and refine the scope of the EIA into the Terms of Reference report. A draft Terms of Reference shall be subject to Public Consultation to ensure that it addresses the likely significant issues of importance. The Public Consultation for the draft Terms of Reference includes statutory timeframes (which have been included in the Plan of Work at Annex A) and should comprise, as a minimum, the following elements:

    a) Publication of the draft Terms of Reference or a link thereto on the DoE's website for a period of 21 consecutive days;

    b) Notification of the publication and public meeting in the local press on two separate occasions, within 10 days prior to the publication of the draft Terms of Reference;

    c) A public meeting at a venue to be agreed with the EAB to present the draft Terms of Reference to be held at least 7 days prior to the end of the consultation period.

90. The proponent's consultants should work with the EAB to ensure that all relevant comments are reflected in the final Terms of Reference. The proponent shall provide a written response to the

[1] http://doe.ky/wp-content/uploads/2017/01/Gazette-EIA-Directive-29-June-16.pdf

consultation comments and these should be appended to the final Terms of Reference report. The approximate cost for a ToR report should be around [redacted] USD.

91. The EIA Report (called the Environmental Statement, ES) is drafted once the Terms of Reference have been finalised and approved by the EAB. Schedule 2 of the EIA Directive outlines the information to be included in the ES. A nearshore ecological diver survey may be required but the remaining studies are likely to be desk-based. The approximate cost for the ES, including survey, is $95k USD (excluding travel which assumes a skilled team is already present on Cayman).

92. A draft ES must go through another Public Consultation prior to a Coastal Works Permit application in order to entertain representations by the public or key stakeholder groups with valid concerns associated with the environmental impacts. The Public Consultation for the draft ES includes statutory timeframes (which have been included in the Plan of Work at Annex A) and should comprise the same elements as the ToR. The proponent must respond to and address (as appropriate) representations received during the consultation on the draft ES. These representations and responses shall be appended to the final ES.

93. The results of the EIA should be used by the project proponent to develop an Environmental Management Plan (EMP) for the project. The EMP will form the basis for environmental monitoring and mitigation during the cable installation and for post-installation compliance. Schedule 3 outlines the information to be included in the EMP.

Onshore Planning Permission

94. Planning Permission for onshore development landward of the Mean High Water Mark (MHWM) is regulated by the Central Planning Authority under the auspices of the Development and Planning Act (2021 Revision). The supporting onshore infrastructure requirements necessary for the cable installation include a Beach Manhole (BMH), associated ducts and, if appropriate, an Beach Anode Array (for a repeatered system). Construction of the BMH and ducts should be complete before the cable comes ashore, and therefore the onshore application submission date should precede the Coastal Works Permit, as detailed in the POW.

95. A list of required documentation is provided in the Permit Tracking Matrix at Annex B, but full detail of Site Plan drawing requirements are provided in the dedicated annex D.

96. In most places along the Cayman Islands coast, the MHWM is a transient boundary which changes over time. For this reason, it is a statutory requirement under the Land Surveyors Act (1996 Revision) and the Land Surveyor Regulations, to carry out a High Water Mark Survey 6 months prior to submitting an application for Planning Permission. This survey must be authenticated by the Department of Lands and Survey which can take 2-3 months during busy periods. The survey itself must be performed by a licensed land surveyor (a list of licensed land surveyors can be found online[2]).

97. There are rules around Notices and a newspaper advertisement requirements and these should be posted after the application is accepted and paid for. Proof of pre-application consultation is required and notification letters to adjacent properties should include a specific description of the proposed development (e.g. excavation of 5 cubic yards at depth of 10 feet for the BMH) and a copy of the site plan should be included.

98. Once Planning Permission is granted, a construction permit must be applied for by the selected Civil Engineering Contractor. All building contractors must be on the registry of engineers with the Department of Planning, details of pre-requisites can be found online[3].

Coastal Works Permit

99. Activities such as survey and cable installation which extend from the Mean High Water Mark seaward over seabed that is Crown property require approval from the Ministry of Sustainability & Climate Change in the form of a Coastal Works Permit (CWP).

[2] https://www.caymanlandinfo.ky/Services/Surveying/Licensed-Land-Surveyors
[3] https://www.planning.ky/licences/civil-engineering-licence/

100. Section 34 (i) of the NCL suggests that a CWP to be issued for the geotechnical aspect of the survey. However, given the sand coverage in the nearshore areas of Cayman Islands are subject to movement with hardbottom coral below, a surface lay within the reef area (Figure 3) is most likely. Sediment extraction (using a Gravity Core or Vibrocore) to determine sediment depths for burial suitability is most likely in deeper offshore areas where there is less environmental sensitivities. Given this situation, an exemption to take sediments onboard for analysis may be possible. It is unlikely that these sediments will be retained onboard, but should they be required for analysis (e.g. authorities may request contaminant analysis) then an export CITES permit would also be required.

101. Given the potential disturbance effects on cetaceans from the use of geophysical survey equipment, this aspect of the survey will require an Application to Conduct a Scientific Study, found online[4] to be submitted to the DOE. The application must provide details of equipment to be used (sound and frequency levels) as well as budget, and on completion, share the survey report and data in a format the authorities require (typically for use with GIS).

102. The Coastal Works Permit application form for the cable installation is an application for an "Underwater Installation" and is included online[5]. One original signed application form plus complete sets of all requested files and other information must be submitted to the Ministry of Sustainability & Climate Change.

103. Upon submission of the CWP application, a notice must be placed in the daily newspaper for one day a week for two consecutive weeks and to all property owners within a 500 linear feet boundary along the coast. The application will not be considered until at least 21 days after the final notice has been published. These timeframes have been included within the POW.

104. The Ministry solicits reviews of Coastal Works proposals from relevant Government agencies, including the DoE. So long as the EIA process has complete with a final ES submitted at the same time as the CWP application, the DoE normally submits its review to the Ministry within 3 weeks of receipt. The Ministry will use the agency reviews to prepare a paper to Caucus and, subsequently, Cabinet who will then make a decision on the application which can take up to 6 months. The Ministry informs the applicant via letter if the application has been approved or refused.

105. Applicants who receive approval will be required to sign a Coastal Works Permit at the Ministry, which is an approval document to conduct works in accordance with agreed conditions. Seabed lease fees, mitigation and any other fees levied for the works must be paid prior to commencement of works.

Seabed Lease, Mitigation and Administration fees

106. The decision of whether an application is approved, modified or refused and ultimately what fees will be charged is left up to the discretion of the Cabinet.

107. A nominal administration fee is applied to process the CWP applications of between CI$300 - $500.

108. Royalties are usually charged for the use of, or impact to, Crown property (the seabed). Offshore developments are normally subject to a one-off Royalty fee in accordance with Cabinet policy and/or Ministry directives, usually on a per square foot or per cubic yard basis depending on the type of project.

109. However the Cabinet may decide to set a seabed lease approach with the Land and Survey Department (who function as landlord of the seabed, similar to the UK's Crown Estate administrations).

110. In regards to requiring mitigation fees for works in Cayman Waters, Section 21 (3) of the National Conservation Law states: "The Cabinet may, as a condition of granting a permit and having regard to the potential damage to natural resources from the activity and the costs to remedy that damage, require the applicant to:

[4] https://doe.ky/resources/brochures/
[5] https://doe.ky/wp-content/uploads/2021/10/CW-Underwater-Installations-Application-Form-Oct-2021.pdf

a) post a bond in a form acceptable to the Cabinet in such amount as the Cabinet may determine;

b) pay a prescribed mitigation fee which shall be paid into the Fund; and

c) pay prescribed royalties which shall be paid into the executive revenue.

111. As a part of the DoE's Coastal Works Review to the Ministry of Environment, the Department will recommend mitigation fees. The fees are typically based on the footprint of the proposed impacted area and the environmental sensitivity of the area.

112. Currently, the DoE recommended fee calculations are based on a number of previously drafted coastal works policies from over the years, and are as follows:

a) When a proposal is located within a Marine Protected Area – CI $10 per square foot.

b) When a proposal is located over sensitive habitats such as seagrass beds or coral formations but not located in a Marine Protected Area – CI $8 per square foot.

c) When a proposal is located in a previously dredged or less sensitive habitat (for example bare sand) – CI $4 per square foot.

Permitting in [redacted]

[redacted]

[redacted]

G. Project Delivery Risks and Mitigations

121. This section aims to highlight risks the Client will encounter in delivering the project, both those common to submarine cable deployments and those unique to this Cayman Islands project. It will be the role of the Client to manage these risks (and any other identified) and to report on their status to the Sponsor on a regular basis, as set out in the Framework and Funding Agreement.

#	Risk	Description	Mitigation	Probability	Impact
1	Schedule	Global demand for submarine cables is at an all-time high. Vessels, manufacturing capacity and raw materials are in high demand, with limited availability leading to increased lead-times for system deployments.	Early engagement with vendors recommended along with ability to execute in a timely fashion. Ultimately there are finite resources, so CIG would be urged to act decisively.	High	High
2	Price	Global demand for submarine cables is at an all-time high. Vessels, manufacturing capacity and raw materials are in high demand, limited availability is leading to significant annual increased pricing for system deployments.	Early engagement with vendors recommended along with ability to execute in a timely fashion. Ultimately there are finite resources, so CIG would be urged to act decisively.	High	High
3	Schedule	Seasonal species sensitivities e.g. turtle nesting beaches in [redacted]	Careful planning and integration into the Plan of Work will reduce the risk probability to Low and consequence of impact to Minor. Should these sensitive seasons be unavoidable, mitigations include the addition of shipboard Marine Mammal Observers, use of Passive Acoustic Monitoring (PAM) equipment, soft-starts, etc.	High	High
4	Schedule	Public Consultation responses contest landing locations.	Early engagement with DOE and using their suggested locations for landing (which are not used in the Strategic Case). DTS Stage can carry out Site Visits at these locations.	High	High
5	Schedule	Reduced options for spurs due to missed opportunities through being unable to match developers' decision-making timescales.	Swift and clear decision-making from Cabinet, with clear mandate for Cable Co developed as quickly as possible following high-level decisions.	High	High

			Increased and ongoing interaction with potential providers. Consider investing in branching units to preserve optionality in the future where decision windows may otherwise close.		
6	Permitting	Non-statutory stakeholder groups lobby government against the development and impacts to reefs which maybe unavoidable.	The project should hold several stakeholder liaison events to educate the public on cable installation methods and impacts.	High	High
7	Challenge from market participants	The project may be subject to challenge from other market participants, the aim of which may be to obstruct, delay or prevent the delivery of the project.	High-quality legal advice should be taken with regard to possible avenues challenge before a final investment decision is made by CIG, on the basis of the proposed funding and financing approach and other commercial factors. Open and transparent public communications with regard to the CIG's plans for the project may help to avoid any future accusation that CIG has subverted any market participants' reasonable expectations.	High	High

H. Benefits management

122. One of the principal roles of the Sponsor is to hold the Client to account for delivery of the benefits that are expected to arise from successful delivery of the project. This section of the Management Case sets out the proposed approach to benefits management for a new cable.

123. The process of benefits management can be broken down into five substages: the identification, definition, planning, tracking and realisation of benefits[6]. Each is discussed below.

Identification

124. The first stage of the benefits management process is to ensure that all possible benefits of the proposed project have been identified. Much of this work has already been done through development of the project's initial Strategic Outline Case, and the Strategic and Economic Cases of this OBC. These include principal benefits such as resilience and available capacity.

125. The benefits to be tracked should be recorded in a benefits register, which details the benefit anticipated, the relevant timescales and any dependencies, risks or issues relating to its delivery identified.

Definition

126. In work to develop the project's Full Business Case, the benefits identified above should be reviewed and refined, and arrangements for their measurement and reporting over the lifetime of the project should be developed. These arrangements should identify the metrics that are to be used to monitor whether or not each benefit has been delivered, and could include for example statistics (e.g. with regard to digital 'outage' frequencies or digitally-focused businesses), or stakeholder or media perception tracking.

Tracking and realisation

127. Responsibility for the tracking and realisation of benefits should be clearly set out in the Framework and Funding Agreement between CIG and the Cable Co. Typically, a Client organisation (in this case Cable Co) is best-placed to track and monitor delivery of benefits, and reports on progress, risks and mitigations to those benefits to its Sponsor on a regular basis, for example as part of the standing agenda of Project Sponsor Board meetings.

128. In this scenario, it would be the responsibility of the lead Sponsor (the SRO) to hold the Client to account for delivery of the anticipated benefits, and to intervene as appropriate if delivery of these benefits are perceived to be at risk.

[6] Steve Jenner, "Managing Benefits", (APMG International 2012), page 15

I. Conclusion and principal recommendations

129. The Management Case comprises two principal elements:

- First, the Management Case considers in detail how CIG should go about establishing the SPV — known in this OBC as 'Cable Co' — that is recommended in Commercial Case. This Cable Co would be a separate entity to take responsibility for the delivery of the Cable, in line with a Project Mandate that should be developed by CIG.

  CIG would take the role of 'sponsor' to the new Cable Co, holding it to account for delivery of the Project Mandate.

  As part of securing CIG's approval for a final investment decision on a new cable, Cable Co should develop a Full Business Case once full tendered costs are known, representing a further evolution of this Outline Business Case. This should set out in detail the proposed delivery approach and negotiated timescales for a new cable, along with a robust commercial approach to the future commercialisation and management of a new cable once it has been delivered.

- The second element of this Management Case comprises a Permitting Feasibility Study, which considers the detailed approach to securing a permit for landing a cable in the Cayman Islands that Cable Co will need to undertake if it is to act as landing party for a new cable.

130. The timelines for the [redacted] and spur options are discussed in E. If a self-build option is pursued at pace, it may be possible to secure delivery of a new cable into service between Q3 2025 and Q4 2026. However, delivery to this timescale is subject to multiple risks and will need to be monitored and managed carefully by Cable Co and CIG as sponsor, as the project moves into delivery. If a third-party spur option is preferred, faster delivery may be possible dependent on the timescales of the third party, but there is likely to be a lower level of certainty of project delivery until the cable is delivered.

131. Regardless of the option pursued, a careful approach should be taken by Cable Co and CIG to monitor and manage identified and emerging risks to successful delivery, including those identified at Section G.

132. The following annexes to this Management Case have been provided as separate documents:

- Annex A: Plan of Work
- Annex B: Permit Matrix
- Annex C: Port Authority's Boating Safety document
- Annex D: Site Plan Drawing Requirements.

Glossary

Glossary of terms and acronyms

Bandwidth	The amount of data that can be transferred from one point to another within a network in a specified amount of time.
BMH	Beach Manhole
BU	Branching Unit, an electronic component on a fibre cable that allows the cable to be split.
C&W	Cable & Wireless.
Cable Co	The name used in this OBC for a potential government-owned special purpose vehicle, responsible for ownership and management of new cable(s).
CAGR	Compound Annual Growth Rate.
Cayman Brac	The most easterly island of the Cayman Islands. One of the Sister Islands.
CIF	Contract In Force.
CIG	Cayman Islands Government.
CJFS	The Cayman-Jamaica Fiber System, connecting Grand Cayman, Cayman Brac and Jamaica..
CLS	Cable Landing Station, a physical location near a beach where a submarine cable makes landfall and is connected to land-based infrastructure.
Dark fibre	Unlit or un-used optical fibre.
Fibre cable	A cable containing one or more strands of optical fibre, along which information can be passed by light.
Fibre pair	Two strands of optical fibre, allowing communication in both directions along a cable.
FBC	Full Business Case, the last stage of the business case process, developed after an Outline Business Case and alongside procurement.
Gbps	Gigabits per second, or billions of bits per second. A measure of data transfer rate/capacity (bandwidth).
GDP	Gross Domestic Product.
Grand Cayman	The most westerly islands of the Cayman Islands, and home to the majority of the country's population..
ICC	International Chamber of Commerce.
ICT	Information and Communication Technology.
ISP	Internet Services Provider.

ITT	Invitation to Tender.
IXP	Internet eXchange Point, physical locations where ISPs can exchange data for their respective networks.
LEO	Low-earth-orbit — relating to a satellite's orbit around the earth which takes 128 minutes or less.
Little Cayman	One of the Sister Islands and the least populous of the three Cayman Islands, approximately 8km from Cayman Brac.
LLA	Liberty Latin America, a telecommunications company.
MAYA-1	A cable system from [redacted] to Columbia with branches to multiple other jurisdictions, that provides connectivity to the Cayman Islands.
MEO	Medium-earth-orbit — relating to a satellite's orbit around the earth which takes between around 2 to 24 hours.
MPAHI	Ministry for Planning, Agriculture, Housing, and Infrastructure.
MRC	Monthly Recurring Charge.
NAP	Network Access Point, a major hub for network traffic.
NOC	Network Operations Centre, a centralised location from where a cable system is managed.
OBC	Outline Business Case.
PFE	Power Feed Equipment, equipment on the shore that provides power to a cable, supplying electronic components such as repeaters.
PLGR	Pre-Lay Grapnel Run, clearance of obstacles on the sea bed before a cable is laid.
PoW/POW	Plan of Work.
PPP	Public Private Partnership.
Repeatered	A fibre cable that incorporates 'repeaters'.
Repeaterless	A fibre cable that does not incorporate 'repeaters'. Also 'unrepeatered'.
Repeaters	Electronic devices spaced at distances of approximately 50 to 100 miles along a cable that amplify signals passed along the cable.
RFQ	Request for Quotation.
ROM	Rough Order of Magnitude.
Sister Islands	Cayman Brac and Little Cayman.
SOC	Strategic Outline Case, the first in the three stages of the business case process.

SPS	Strategic Policy Statement, a 2021 document that outline’s CIG’s policy priorities.
SPV	Special Purpose Vehicle.
SRO	Senior Responsible Officer.
Unrepeatered	A fibre cable that does not incorporate repeaters. Also ’repeaterless’.