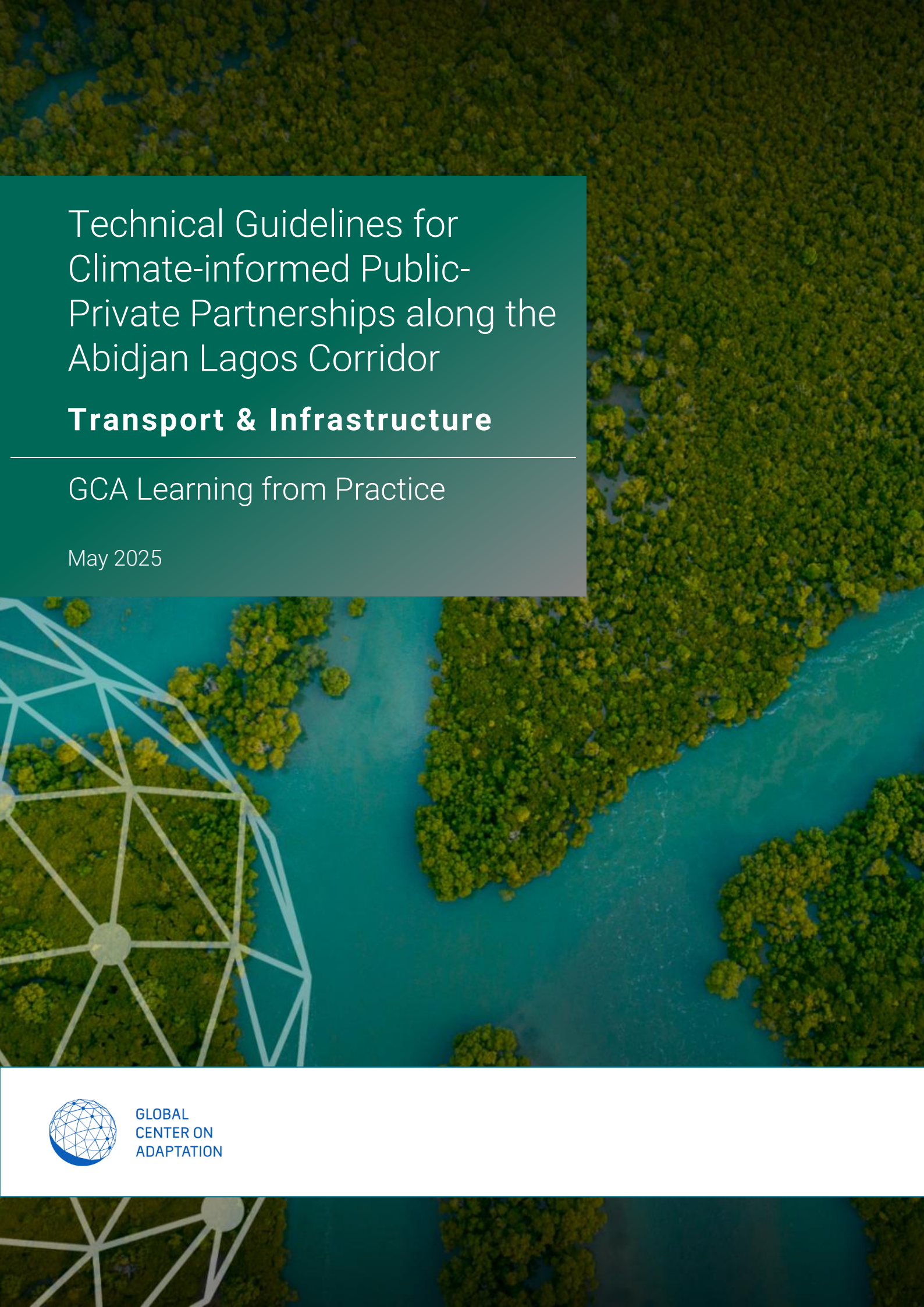

Technical Guidelines for Climate-informed Public-Private Partnerships along the Abidjan Lagos Corridor

Transport & Infrastructure

GCA Learning from Practice

May 2025

GLOBAL CENTER ON ADAPTATION

This series of GCA Learning from Practice notes provides a practical reference to support the design and implementation of climate adaptation analyses. Drawing on the experience and lessons from GCA programs, each note focuses on a specific methodological component, offering guidance on key concepts, minimum standards, and recommended practices to strengthen the quality, consistency, and usability of analytical outputs.

Intended for practitioners, analysts, and decision-makers, the notes aim to balance scientific rigor with operational relevance. By translating experience into clear methodological benchmarks and actionable guidance, the series supports credible analyses and enables more informed planning, investment, and adaptation decisions.

AUTHORS & ACKNOWLEDGEMENTS

This report was developed by:

Global Center on Adaptation: Adele Cadario, Global Lead, Infrastructure and Nature-based Solutions; Cedric Malaval, Senior Specialist; Aikaterina Myserli, Senior Program Officer, Infrastructure and Nature-based Solutions. Contact: infrastructure@gca.org

Partnerships and coordination with: African Development Bank, ALCOMA and ECOWAS.

Consultants: Zutari (Pty) Ltd, Pegasys. Contact: PhillipH@pegasys.co.za

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GLOBAL CENTER ON ADAPTATION

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The Global Center on Adaptation (GCA) is an international organization, hosted by the Netherlands, which works as a solutions broker to accelerate action and support for adaptation solutions from the international to the local, in partnership with the public and private sector, to ensure we learn from each other and work together for a climate resilient future.

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ECOWAS aims to promote cooperation and integration in West Africa, establish an economic union to improve living standards, enhance economic stability, foster relations among member states, and contribute to the African continent's progress and development. ALCoMA was established through ECOWAS to ensure the harmonized construction and efficient operation of the Highway. As a supranational authority, it will guarantee the smooth operation, development, and maintenance of the Highway.

ABOUT THE ECONOMIC COMMUNITY OF WEST AFRICAN STATES (ECOWAS)

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ABBREVIATIONS

Abbreviation	Definition
ADPC	Asia Disaster Preparedness Centre
AfDB	African Development Bank
ALCoMA	Abidjan-Lagos Corridor Management Authority
ALHP	Abidjan-Lagos Highway Project
CCA	Climate Change Adaptation
CSAZ	Savannah agroecological zone
CCKP	Climate Change Knowledge Portal
CMIP	Coupled Model Intercomparison Project
CRST	Coastal Risk Screening Tool
CRVA	Climate Risk and Vulnerability Assessment
CSS	Climate Safeguards System
EbA	Ecosystem-based Adaptation
ECOWAS	Economic Community of West African States
ESA	European Space Agency
ESL	Extreme Sea Level
GCA	Global Center on Adaptation
GIS	Geographic Information System
IDF	Intensity-Duration-Frequency
IFI	International Financial Institutions
LIC	Low Income Countries
MOLOA	*Mission d'Observation du Littoral Ouest Africain*
MSL	Mean Sea Level
NbS	Nature-based Solutions
°C	Degrees Celsius
O&M	Operation And Maintenance
OECD	Organisation for Economic Co-operation and Development
PPP	Public Private Partnership
SEP	Stakeholder Engagement Plan
SSPs	Shared Socio-economic Pathways
SSW	South Southwest
SW	Southwest
SWS	South WestSouth
UKAID/FCDO	Foreign, Commonwealth & Development Office
UNECA	United Nations Economic Commission for Africa
USAID	United States Agency for International Development
WBCCKP	World Bank Climate Change Knowledge Portal

CONTEXT AND OBJECTIVES

The Abidjan–Lagos Highway Project is a strategic regional infrastructure initiative led by the Economic Community of West African States, in partnership with five corridor countries: Côte d'Ivoire, Ghana, Togo, Benin, and Nigeria. The project aims to strengthen regional connectivity, trade, and economic integration across West Africa. Selected sections are being developed under a Public-Private Partnership (PPP) model, with the African Development Bank supporting project preparation and financing structuring.

Given the long-term and regional importance of the corridor, integrating climate risks across planning, design, operation, and maintenance is essential. In this context, the Global Center on Adaptation, through the Africa Adaptation Acceleration Program, supports stakeholders in systematically considering current and future climate risks, and in embedding appropriate resilience measures within the PPP framework over time.

This report presents Technical Guidelines for Climate-Informed PPPs, drawing on GCA's technical assistance to the project. It distills practical, experience-based insights to inform a broader range of stakeholders and support PPP development in similar institutional, economic, and geographic contexts. The guidelines compile non-sensitive lessons to strengthen climate-informed infrastructure approaches and provide practical guidance to assess and mitigate climate risks affecting assets, services, and the communities and economic activities they support.

The analysis explores two main approaches to integrating climate resilience into PPP contracts. The first is an "output-focused approach", which incentivizes private contractors to invest in adaptation by transferring climate-related risks to them, including through adjustments to force majeure provisions. The second is an "input-focused approach", which embeds specific technical and operational climate resilience requirements directly into the PPP contract.

For the Abidjan–Lagos Highway Project, the input-focused approach is further explored as the by-default recommended options, based on several contextual factors, including the relatively nascent PPP contracting environment in West Africa, limited availability of climate data and projections, an underdeveloped market for climate risk insurance, and fiscal constraints that increase the risks associated with private partner underperformance. Together, these factors suggest that clearly defined resilience requirements are more effective than risk transfer mechanisms alone.

In this context, and building on detailed climate risks analysis and stakeholders consultation, the guidelines showcase a range of adaptation and resilience option which could be relevant in the context of this corridor, and presents practical guidance on how these elements can be integrated into the different stages of PPP project development and implementation. These learnings include:

- an assessment of the climate hazards likely to affect the project,
- the identification of adaptation measures to mitigate these risks, and
- the definition of technical specifications to support climate-resilient infrastructure design and operations.
- Last, the institutional landscape supporting the highway corridor, identifying capacity gaps and opportunities to strengthen the enabling environment for climate-resilient PPP delivery, together with a set of targeted institutional and capacity-building interventions to support the effective integration of climate resilience measures within the project

None of the information contained in these Technical Guidelines is directly related to the financial specifics of the Abidjan - Lagos Highway Project. The considerations presented build on GCA broader learnings and stakeholder discussions, including with the African Development Bank, the Economic Community of West African States, and collaborating agencies listed in the acknowledgements. Detailed, project-specific analyses, including investment-related assessments, have been developed separately and are not included in this public version.

1. INTRODUCTION

1.1 Background and context

The Global Center on Adaptation (GCA) has commissioned a comprehensive climate risk and vulnerability assessment to inform a cost-benefit appraisal (CBA) for Nature-based Solutions (NbS) and the development of climate-informed Public Private Partnerships (PPP) frameworks and operating standards along the highway. The Abidjan to Lagos Highway is a flagship project of the African Development Bank (AfDB) Program for Infrastructure Development in Africa. The transport corridor forms part of the wider Dakar to Lagos Corridor and is a major part of the Trans-African Highway Network within the West- Africa region. The Abidjan to Lagos Highway interconnects the capital cities of five West African states (Côte d'Ivoire, Ghana, Togo, Benin and Nigeria), covering approximately 1,028 km and eight border crossings along the Gulf of Guinea coast. The highway's current alignment traverses all major economic centres of the five participating member countries starting from "Bingerville", a suburb of Abidjan and ending at Mile 2 (Eric Moore), in Lagos. The project aims to create an economic corridor that facilitates trade and transport flows between the main activity centres of the Economic Community of West African States (ECOWAS) region through a coordinated set of multimodal transport and logistics infrastructure services that can open up landlocked countries such as Mali, Burkina Faso, and Niger.

Road transportation along the West African coastline is essential for the region's economic development and growth. The highway from Abidjan in Côte d'Ivoire to Accra in Ghana, extending to Lagos in Nigeria and connecting various urban centres, forms a critical infrastructure backbone supporting the region's economy. Developing an efficient transportation system can substantially contribute to regional economic development, particularly by addressing current logistics challenges and enhancing the transport of trade goods across borders. To further unlock the region's economic potential and ensure the sustainability of coastal transportation routes amidst climate change impacts, it is crucial to assess and provide technical assistance focused on climate resilience and sustainability of the transport highway.

Climate change poses a considerable threat to transport systems, especially in developing countries (Cervigni, et al., 2017). The potential impacts of climate change for roads, including extreme weather events, rising temperatures, sea level rise (SLR), and coastal erosion, should be considered for the design, maintenance, and operation of road infrastructure. Ignoring these impacts can lead to frequent damage, shortened infrastructure lifespans, increased operational and maintenance costs, and the need for complete replacements. Therefore, incorporating climate resilience into the infrastructure associated with road transport is imperative to maintain the longevity and effectiveness of this vital enabler of trade and development. In response to this, the Global Center on Adaptation (GCA) has commissioned a comprehensive climate risk and vulnerability assessment to inform a cost-benefit appraisal (CBA) for Nature-based Solutions (NbS) and the development of climate-informed Public Private Partnerships (PPP) frameworks and operating standards along the highway. The study is being undertaken by the GCA with a team of experts led by Pegasys International and supported by Zutari (Pty) Ltd and Aqua Earth.

This assignment offers technical support to AfDB for the Abidjan-Lagos Highway project, focusing on identifying and quantifying significant climate hazards along the road highway.

1.2 Project location

The Abidjan-Lagos Development Highway spans five countries – Benin, Côte d'Ivoire, Ghana, Nigeria and Togo, with a length of approximately 965 kilometres. The extent and location of the highway is presented in Figure 1-1 below.

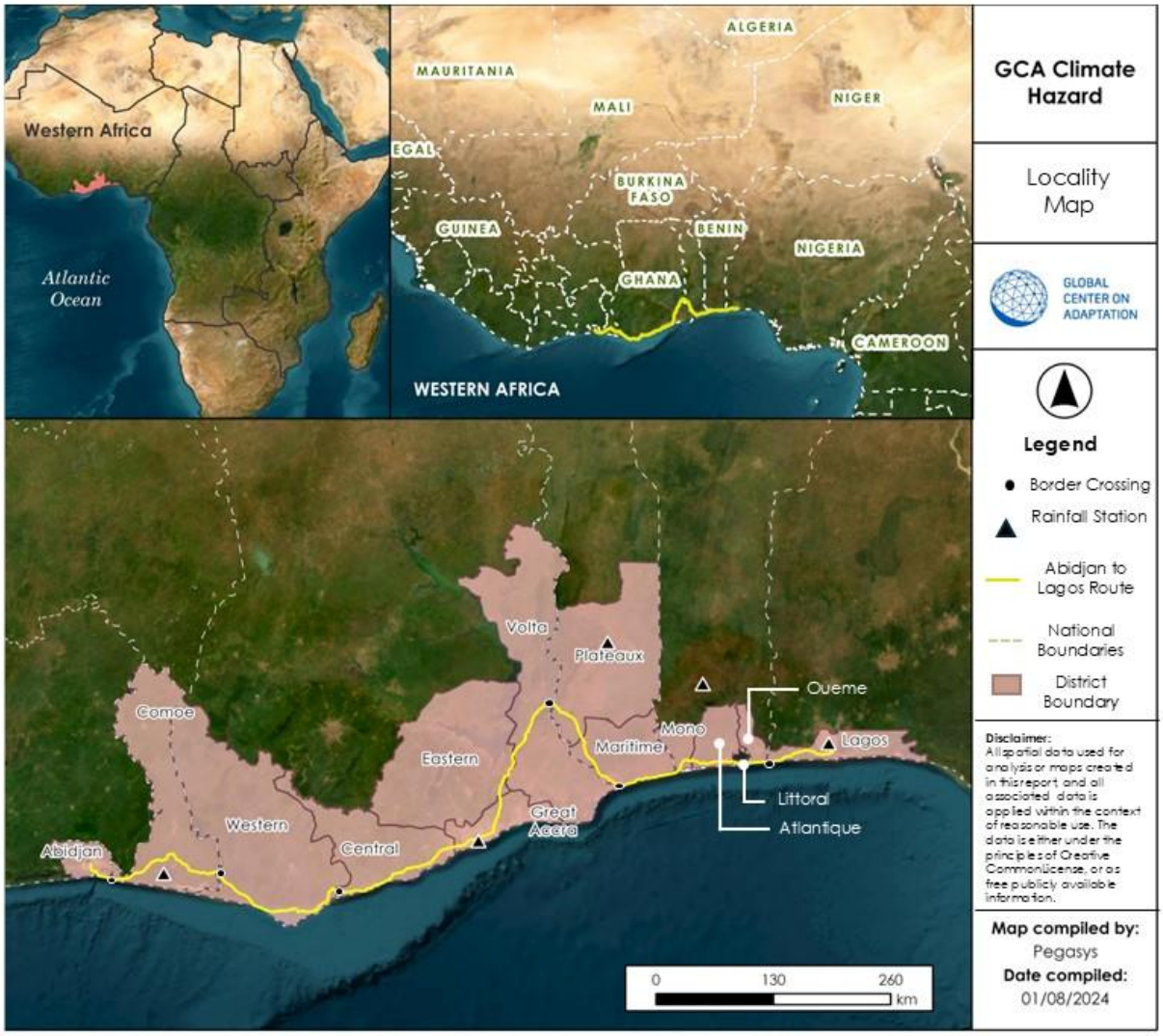

Figure 1-1: Abidjan-Lagos Road Alignment

1.3 Status of the project

The Abidjan-Lagos Highway Project (ALHP) began in 2013, following a joint decision by the presidents of the five countries along the highway, formalized by a Treaty signed in March 2014. A key milestone included the ratification of the Treaty by all Member States, creating a legal and institutional foundation for the project. Member States have also approved project-financing agreements for feasibility and detailed engineering studies, with consultations underway with the African Development Bank (AfDB) to secure additional funds. Institutional frameworks have been crafted to oversee the project's preparation, construction, operation, and maintenance, leading to the establishment of the Abidjan Lagos Corridor Management Authority (AlCoMA)—Africa's first transnational corridor authority. The next phase involves attracting private investors and donors through market research sessions after completing technical design studies.

1.4 Purpose of the Report

The development of the highway is anticipated to take place using a Public Private Partnership procurement model. Reducing the climate vulnerability of the highway will therefore require incorporating resilience measures (including revised standards and NbS) into the proposed PPP contracts.

The purpose of this report is to give recommendations for how climate change related risks can be incorporated into the planned Public Private Partnership (PPP) arrangements for the Abidjan-Lagos Highway project. The focus is specifically on how the future Private Parties can support the development of Climate Resilient infrastructure (leveraging NbS) along the highway (increasing both the *resilience of the infrastructure and resilience through the infrastructure*).

1.5 Structure of the Report

The report is organised as follows:

- Chapter 1 is the current section contains an introduction to the report.
- Chapter 2 briefly unpacks the concept of PPPs, specifically understanding PPPs in the transport environment and how this will then potentially apply to the Abidjan to Lagos Highway.
- Chapter 3 explores how climate resilience is typically incorporated into PPP agreements.
- Chapter 4 then focuses on the Abidjan to Lagos Highway and specifically identifies the climate resilience inputs to be incorporated into the future PPP contracts.
- Chapter 5 then shifts to the institutional landscape along the highway (the nature and extent of the current institutional set-up) to provide the necessary support for the proposed interventions and decide on what changes might be required to enable the climate resilient PPPs.
- Chapter 6 concludes the report.

2. UNDERSTANDING TRANSPORTATION PPPS

2.1 Why PPPs?

PPPs are a means of engaging private sector capital (i.e. resources such as manpower, innovation and ingenuity, and funding / investment) in the provision and improvement of transport infrastructure and services, by sharing investment risk with the public sector. Although the benefits of PPPs, as stated in the literature, are extensive, the primary gains from PPPs are (SADC, 2006):

- Private sector funding (off-balance sheet for public sector).
- Private sector innovation and ingenuity.
- Optimal whole life lifecycle costing (long-term sustainability).
- Improve asset utilisation and efficiency; and
- Optimal sharing of responsibilities (risks) between private & public sectors.

However, the requirements of developing countries may also include the following:

- Increase in capacity of public sector (ability to initiate and oversee projects) while reducing the burden of management.
- Identification of an additional source of revenue (through direct user charging based on the user-pay principle).
- Arrangement of funding by private sector ("off-balance sheet" financing for public sector) and additional investment in transport infrastructure and services; and
- Provide opportunities and develop local construction industry.

The benefits listed above accrue primarily to the public sector. There are obviously also benefits to the private sector such as more business opportunities, creation of jobs, and economic growth in general, which also benefits the civic society at large.

2.2 Defining PPPs

For the purposes of this document a PPP is defined as a project with a **performance-based output** specification which will result in **significant advantages compared to normal public procurement** in terms of one or more of the **primary benefits** listed before by means of a **cooperative venture** between the **public and private sectors**.

PPPs cover the full spectrum of low-end PPPs to high-end PPPs. As mentioned above, low-end PPPs are little more than general contractual agreements that contain one or more of the typical characteristics of a PPP and are commonly in use today without being labelled as a PPP. On the other end of the scale "high-end" PPPs are referred to as concessions which are typically associated with substantial transfer of risk and responsibilities and even temporary ownership of transport infrastructure and services.

The terminology used for the private sector entity with whom the contract is concluded can be ambiguous. Since skills more extensive than that of a contractor are generally required (the contractor can also be one of the contractual parties forming a concessionaire), and the format of the project delivery scheme is not necessarily a full-blown concession (i.e. concessionaire), the term private sector project partner (project partner in short) should rather be used as a generic term to indicate the private sector partner of government in the transaction.

2.3 Fundamental principles in PPPs

The value derived from PPPs is generally accepted to be rooted in number of foundational issues that distinguish them from normal governmental projects. These include:

- Risk allocation and mitigation
- Value for money
- Output rather than input specification
- Applying user charges
- Affordability.

2.3.1 Risk allocation and mitigation

One of the key issues in PPPs is the transfer of risk. The benefit of PPPs over traditional (design-bid-build) procurement is rooted in the fact that many project risks are generally not recognised or accounted for by governments under normal procurement, leading to projects to go over budget and over time. In PPPs, project risks are therefore firstly fully identified and appraised. Thereafter, risks are transferred to the party that can best manage that risk (i.e. control its occurrence). In this way PPPs help shelter governments from risk and provide for value over traditional procurement through the proper identification and management of risk.

The amount of risk transferred to the private partner however differs and should be evaluated on the following basis:

- Risk must be transferred to the party best suited to manage the risk;
- Risk must be proportionate to the compensation – i.e., the party accepting this risk will demand just compensation; and
- A common flaw in the structuring of PPPs by Government is to transfer unnecessary risks (primarily caused by a lack in information) to the private party which then prices this risk (i.e. uncertainty) accordingly. This results in unnecessary high costs or payments or toll rates which erodes the economic benefits of the project.

In general terms, PPP project risks can be divided into commercial risk and legal and political risks (EPEC, 2010)

- Commercial risk generally entails the risks associated with delivering of the project including construction risks, operational risks, financial risks (including the risk of changes in the cost of capital or changes in exchange rates and inflation), and demand risk (the risk of insufficient traffic volumes).
- Legal and political risks include risks that relate to the legal framework, dispute resolution, the regulatory framework, government policy, taxation, expropriation and nationalisation.

In general, it is recognised that the private sector is better placed to assume commercial risk while the public sector is better placed to assume legal and political risk. However, different forms of PPP have different risk sharing profiles which may require government to stand in for some commercial risks. Governments can employ various risk sharing instruments to limit the cost of a project. These include (DBSA, undated)

- Equity guarantees: This option provides a concessionaire with the option to be bought out by Government at a price that guarantees a minimum return on equity. Government effectively assumes project risk and reduces the corresponding private sector initiatives.
- Debt guarantees: This option guarantees that the government will pay any shortfall related to principal and interest payments of the project. The Government may also guarantee any refinancing that is scheduled - this creates significant government exposure and reduces private sector incentives.
- Exchange rate guarantees: Here the government agrees to compensate the concessionaire for increases in financing costs due to exchange rate effects on foreign financing. Exchange rate

guarantees expose the government to significant risk and increase the incentives to utilise foreign capital.

- Grants/subsidies: These are contrary to equity and debt guarantees that create contingent liabilities for the government. Government can furnish grants or subordinated loans at project inception, buying down the size of the project that needs private finance.
- Subordinate loans: These loans can fill the gap in the financing structure between senior and equity. From the government's perspective, they also have the attractive feature that they can be repaid with a return if the road is successful. These loans improve feasibility by increasing the debt service coverage ratio on senior debt and by reducing the need for private equity, which requires a higher return.
- Minimum traffic and revenue guarantees: This is a common form of support for user fee-based PPPs (e.g. toll roads) where the government compensates the concessionaire if traffic or revenue falls below a minimum threshold. If the government shares "downside risk" with the private sector through guarantees, it should also consider seeking instruments that allow profit on the "upside".
- Concession extensions and revenue enhancements: In this option the Government can extend the concession term if revenues fall below a certain amount. Government can also restrict competition or allow the development of ancillary services by the concessionaire.
- Change in contractual obligations: In this option the Government can allow the redesign of contractual obligations.

2.3.2 Value for money

The selection of a PPP delivery method over a traditional design-bid-build method is generally based on an assessment of the extent to which it provides greater value to the government than the traditional approach. This is generally referred to as Value for Money (VfM) assessment. This assessment should consider all the benefits, costs and risks related to the project over the whole of the life of the project – this is essentially a cost-benefit analysis. The rigorous identification and management of project risk (as discussed above) therefore forms a central part of the project selection decision.

As the EPEC report (2010) explains:

> "In some countries like the UK, which have extensive PPP programmes, a PPP project is said to achieve Value for Money if it costs less than the best realistic public sector project alternative (often a hypothetical project) which would deliver the same (or very similar) services. This public sector alternative is often referred to as the public sector comparator (PSC)."

The value derived from PPP projects are often illustrated using the graph in Figure 2-1. As shown, the cost of the project to the public sector (referred to as the Public Sector Comparator or PSC) is made up of the following components:

- Retained risk represents the risk that cannot be transferred to the private sector, and this includes aspects such as government non-performance risks, change of law risks, etc.
- The Raw Public Sector Comparator is the cost that the government would normally associate with delivering the project, i.e. what it would cost in actual money spent if the government was to deliver the project
- Due to the competitive nature of PPP procurement, there is a typical saving under the PPP option due to competitive tension. In the PSC option, the cost is therefore expected to be higher. This is recognised as a separate cost, Competitive Neutrality, in the PSC.

- Lastly, there are some inherent risks to the project delivery (such as design risks, schedule risks, completion risks, environmental risks) that are **generally transferrable** to the private sector under the PPP option. The public sector is often ignorant of the fact that they bear this transferrable risk under normal procurement. To properly compare the cost of the PSC with the PPP option, these risks need to be recognised, as they are already priced in the PPP project cost.

In contrast, the cost to the public sector of the PPP comprises only the actual PPP bid price (with the transferred risk already accounted for in the price) and the cost of the risk that cannot be transferred to the private party.

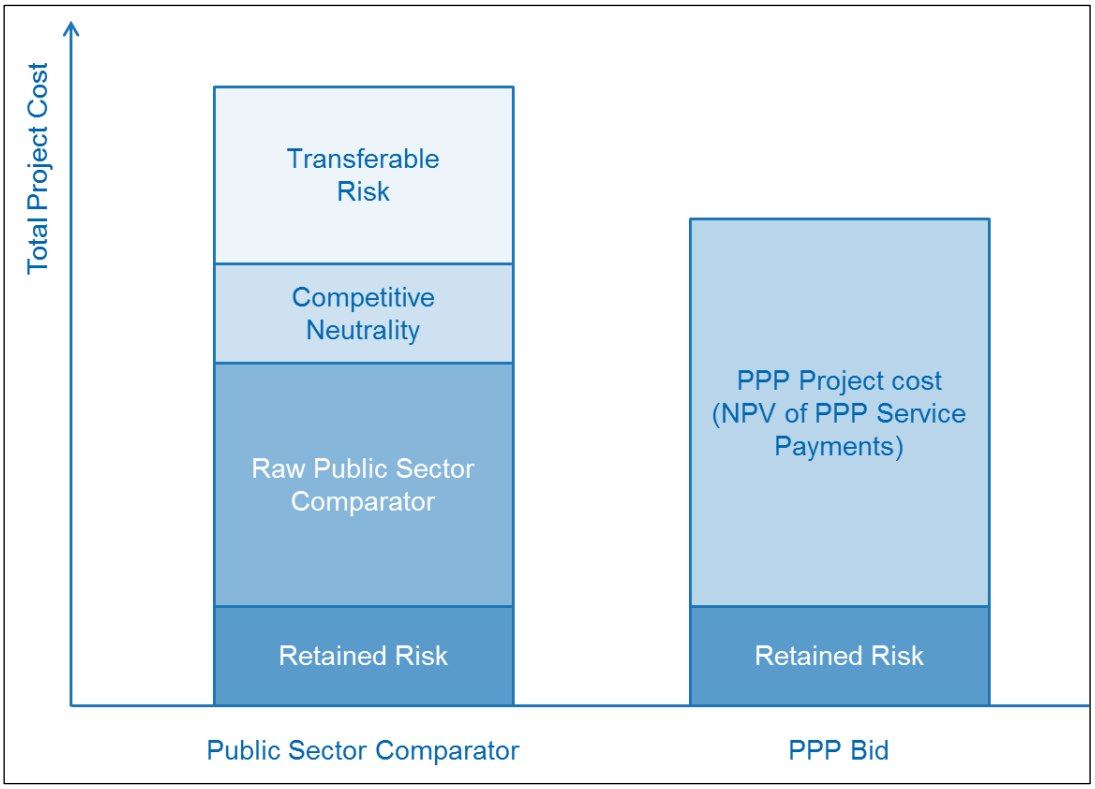

Figure 2-1: Comparing the costs of public and PPP procurement (Partnerships Victoria, 2001)

2.3.3 Output versus input specification

A second foundational difference between traditional governmental procurement and PPPs is the fact that project specifications are aimed at project "outputs" rather than "inputs". That is, contracts do not specify exactly how the required outcomes that the government requires should be delivered (e.g. "a single carriageway road") but rather stipulates only the service level of the outcomes that are required (e.g. "free-flow speed of 80km/h in peak times"). Compliance is then measured in terms of the attainments of pre-stipulated outcomes rather than checking the execution of governmentally prepared designs and specifications. These are generally referred to as "output specifications" in contrast to the "input specifications" of normal delivery.

The motivation for using output specification is that it both allows for the transfer of design risk to the providers, while also increasing private sector innovation. This flexibility on the part of the private provider is also anticipated to ensure whole of life cost savings. It should however be noted that the shift from input specifications to output specifications is often not an easy transition for government departments.

2.3.4 User charges

As we define below, one of the options for funding of PPPs is through direct user charges. In some types of transportation services user charges are already being applied (for example in public transportation). However, the implementation of some forms of PPP requires the introduction of user charges for services that were traditionally considered "free".[1]

One of the most controversial transportation user charges implemented as a result of PPPs is road tolls. One of the main reasons for the popularity of toll roads is that such roads become entities that can be privatised. They can be operated and maintained as a "franchise" under complete private ownership, thus relieving Government of any responsibilities in this regard.

The introduction of user charges under toll roads, however, makes the more general taxation systems of road user charging more complex. The dilemma experienced is that having charged the road user through road user charging instruments such as license fees, fuel levies and weight distance charges, the road user should be rebated for the amount of travel he makes on a toll road, for which he has paid directly. This dilemma is exacerbated by the fact that highly trafficked roads cross-subsidise low traffic roads, and if the highly trafficked roads were to be taken out of the RUC system, the RUC system could face a significant decrease in funding availability for low trafficked roads.

The toll fee usually covers all costs (fixed and variable) associated with the toll road i.e. the full cost of the road is recovered via toll fees.

The socio-economic implications of tolling are often only related to local impacts on communities for which no good alternative roads are available for access. The justification of tolling is based on the premises that the perceived benefits by the road user should equal or exceed the tolling costs. Even with the tolling of existing roads, the benefits of better maintenance should result in lower vehicle operating cost for the road user; i.e. the benefits (less vehicle operating cost) should equal or exceed the costs (tolling costs).

Toll roads in developing countries without alternative routes can lead to significant social risks, including financial burdens on low-income populations, reduced accessibility to essential services, and economic segregation. These roads may exacerbate regional disparities and lead to political and social tensions due to perceptions of unfair taxation. Overall, they can hinder equitable development by limiting access to opportunities for those who cannot afford the tolls.It is however true that short-term affordability and out-of-pocket cash flow may be an issue with the paying of tolls; i.e. although there is a long-term benefit, the road user may not be able to afford the toll fees (as discussed below). Detailed social-impact assessment should be done at a local level and forms part of the concessionaire's responsibility. This is one of the criteria that should be assessed during the evaluation of tenders.

2.3.5 Affordability

The term "Affordability" refers to whether a PPP project the government implementing it, and (where applicable) the users that are charged user fees as a result of it, can manage the associated expense. When assessing the feasibility of a PPP project, governments should therefore "examine the level and structure of the project's overall revenue requirements in relation to the capacity of users or the public authority to pay for the service" (PPIAF, 2009: 23).

2.3.5.1 Governmental affordability

The majority of PPPs (except where projects are funded solely through user fees) require some form of governmental financial commitment over a set timeframe. This is specifically the case for service / management contracts or availability-based concessions (see below for a full discussion on these

[1] The term "free" can be misleading here, as in most respects the funding source is just more indirect, such as through general taxes.

modalities). It is therefore important that any government undertaking a PPP has a full appreciation of the financial commitment and burden that the project will entail, to ensure that it will be affordable.

It should be mentioned here that "affordability" from a technical capacity point of view also presents a significant challenge to governments hoping to implement PPPs.

2.3.5.2 Users' ability to pay

The affordability of user fees (also referred to as users' "ability to pay") is of specific concern in the case of toll roads where local residents are dependent on toll roads for access. Ways to deal with this local impact is to provide special local user discounts and/or frequent user discounts. These concessions however increase the administrative burden on the concessionaire and provide opportunities for corruption. It is hence the preferred option to locate toll plazas in such a way that they do not affect any local community adversely. This aspect should therefore receive the necessary attention during the design stage.[2]

To determine affordability is a complex investigation that falls outside the scope of this appointment. However, a more manageable approach to deal with this issue is to ensure that the user fees are less or equal to the saving in vehicle operating cost (VOC). It then follows that the benefits of tolling should exceed the costs easily. It then also stands to reason that if you can afford to drive a motor vehicle you can also afford to pay the toll fees.

A report on Private Sector Participation by the PPIAF mentions a number of ways to address user affordability (PPIAF, 2005: 14):

In some cases, it may be possible to ensure that the poorest citizens are able to afford a basic level of service by applying tariff structures that incorporate a significant element of cross-subsidy from high-volume users of a particular service to those who use it in relatively small quantities. There are well-recognised drawbacks with such an approach, however. Disproportionately high charges to large users—particularly to business and industrial customers—may deter them from, for instance, using water in productive ways that would otherwise have promoted economic development. Moreover, a tariff system that forces an operator to serve the least well-off on a loss-making basis while adding to the profitability of serving the better-off will inevitably create incentives for the operator to focus its attention on the rich while ignoring the poor. Despite these potential drawbacks, some element of cross-subsidy in tariffs is generally acceptable as long as it is kept to relatively modest levels.

An external subsidy for operating and maintenance costs is widely regarded as inconsistent with efficient and sustainable provision of service. The private sector generally perceives that a high level of risk is associated with external subsidy because of the possibility that support will be withdrawn in the future. Therefore, relying on an external operating subsidy is also likely to discourage private operators from taking part in PSP (Private Sector Participation) schemes.

The case for up-front capital subsidies, where necessary, is much stronger. Capital subsidies may enable the extension of service to poorer groups that cannot afford the full costs of connection but are able to pay tariffs that cover operating and maintenance costs. The private sector is likely to be less concerned about a subsidy that is committed up front or at least over a relatively short initial period of the project. In addition, the ability of customers to pay tariffs that cover operating expenses is consistent with long-term sustainability of providing services. Until recently, the principal means of providing capital subsidies have been through co-financing of concession arrangements. Under this approach, one or more international lending agencies, usually through the host government or a parastatal agency will provide a package of grant or soft-loan financing to the project company. The company will then apply the grant or loan, alongside funds provided by its parents or shareholders and the commercial banks, toward capital projects that serve both poor and relatively wealthy customers.

[2] South Africa has dealt with this in the past by providing alternative roads to PPP toll roads. The legislation requiring the existence of alternative roads was however repealed to stop financial overburden. This issue is discussed further in Annexure A.

The main drawback associated with co-financing is the weak incentives for the operator to actually achieve the level of performance—for example, utility connections to poor households—that underlies the financial aid provided. Alternative forms of support that involve the disbursement of subsidised financing only as and when there is tangible achievement against measurable targets are currently being seen as a preferable alternative. This performance-related approach to the provision of aid funding is generally termed output-based aid (OBA).

2.4 Identifying PPP delivery models

The options for private sector participation can be arranged along a spectrum: At the one end are those in which the government retains full responsibility for operations, maintenance, capital investment, financing and commercial risk such as service and management contracts – at the other, those in which the private sector takes on much of this responsibility such as Concessions and Build-Operate-Transfer Contracts. Even in the case of concessions where the private sector takes on full responsibility for operations and financing, it does so within a framework created by the government. The most important parts of this framework are regulatory arrangements to protect consumers from monopolistic pricing and to enforce the required transportation standards and subsidy arrangements to ensure equitable access to public transportation assets.

The main options for private sector participation can be clearly distinguished by how they allocate responsibility for such functions as asset ownership and capital investment between the public and private sectors.

Table 2-1: Distinguishing the different PPP delivery models (Adapted from Davis, J., 2005)

Option	Asset Ownership	Operations and Maintenance	Capital Investment	Commercial Risk	Duration
Service contract	Public	Public and private	Public	Public	1-2 years
Management contract	Public	Private	Public	Public	3-5 years
Lease	Public	Private	Private or Public	Shared	8-15 years
Concession, BOT and variations	Private or public	Private	Private	Private	25-30 years
Divestiture	Private or private and public	Private	Private	Private	Indefinite (may be limited by license)

These possible PPP project options or modalities are discussed in more detail below.

2.4.1 Service and management contracts

In service and management lease contracts, the private provider takes over a role traditionally fulfilled by a public entity for a fixed period. This might entail the maintenance of an asset or the provision of a certain service (such as vehicle fleet management or IT support services). There is no transfer of asset ownership and no direct private sector capital investment, therefore investment decisions and commercial risks remain with the state.

Service and management contracts are useful for short term, low-risk, performance-based applications, such as the maintenance of very low volume roads. The have the benefit of being able to involve lower-skilled smaller local contractors (although this is not always the case). Management contracts can also be concluded over a slightly longer period of 5 to 7 years.

2.4.2 Brownfield projects (leases and concessions)

The second broad delivery scheme entails PPPs that involve existing infrastructure assets, where asset ownership is not indefinitely transferred to the private sector. We can distinguish a number of variations here:[3]

- Lease – The government leases the infrastructure assets to a private party, where the private party takes on the operational risk of managing and operating them. This form of contract is uncommon in transportation projects.
- Franchise – Here the private entity takes over an existing asset, and operates and maintains it for a fixed term contract, often with an obligation of upgrading the asset. This is often accompanied with an initial lump sum payment by the private entity to the government for acquiring this franchise.
- Rehabilitate, Operate, Transfer (ROT) – A private operator rehabilitates the asset and then operates and maintains it for the remained of the contract period (commercial risk borne by private party).
- Rehabilitate, Lease, and Transfer (RLT) – Similar to ROT but here the private provider pays an additional lease (or rent) payment for the right of operating the asset.
- Build Rehabilitate Operate Transfer (BROT) – Similar to a ROT but the projects includes the construction of an extension or addition to the existing asset / facility

2.4.3 Greenfield projects (BOT and variations)

The delivery scheme that is most commonly referred to as a PPP in the literature is where a private entity is contracted to build a new infrastructure asset which it then runs for a set time, typically 20 – 30 years, before usually (but not always) handing it over to the government. These Greenfield projects go by different (often confusing) acronyms, including:

- Build Operate Transfer (BOT), i.e. a concession to finance, build and operate an asset without ownership of the facility ever resting with the private party;
- Build Own Operate (BOO), i.e. the concessionaire owns the assets and has no obligation to transfer the assets back to Government at the end of the contract.
- Build Transfer Operate (BTO), i.e. build and transfer immediately with subsequent operation and possibly subject to instalment payments of the purchase price.
- Build Own Operate Transfer (BOOT), i.e. as BOT but with ownership passing to the concessionaire during the concession period.
- Build Lease Transfer (BLT), i.e. after building the asset, the concessionaire rents or leases it from Government and eventually transfers it again. This form of contract is specifically popular in South Korea.

It should be noted that Greenfield PPPs are typically the high-end solutions for PPPs. Experience shows that opportunities for these options are few in developing countries given the high cost of implementing them. The opportunities for management/service contracts and maintenance concessions are much more abundant in developing contexts and their value should not be under-estimated.

2.4.4 Divestitures

Divestitures are where public assets are transferred indefinitely to the private sector. Here we can distinguish between full and partial divestitures, the latter entailing the sale and transfer of only a portion of the ownership of assets to a private entity.

It should be noted that Divestitures have in recent time been largely excluded from the range of PPPs.

Many commentators (see for example PPIAF, 2009) now define this delivery model where asset ownership (and therefore implied service accountability) rests with the private sector, under the collective

[3] Franchise, ROT, RLT, and BROT are all forms of brownfield PPP concessions.

term “privatisation”. This exclusion is specifically aimed at distancing PPP programs from the legitimacy issues associated with the sale of public assets.

2.5 Funding arrangements

As PPPs generally involve a private party taking responsibility for the operation and maintenance of an infrastructure asset, most PPP arrangements (regardless of delivery model) requires an on-going funding source or revenue stream. The two general models are: (i) Where users of the asset pay directly for the provision thereof, or (ii) where the government pays for the asset or service provision (and users therefore pay indirectly through taxes). The second model can be further separated into shadow tolls and availability payments. Each of these funding arrangements are discussed in turn.

2.5.1 Direct user-fee (conventional tolling)

The first type of funding mechanism for PPP transportation assets is through direct user fees or conventional tolling (also called revenue-based PPPs). A typical (and probably the most well-known example) of a user fee-based PPP is a toll road, where the users of the road pay for the asset as they are using it. The most important advantage of user-fee based PPPs is that a new source of revenue (namely tolls collected from asset users) is introduced instead of an additional application of existing sources (such as fuel taxes of general government funding). In this way the bankability of projects is not directly influenced by the creditworthiness of the public authority. An additional benefit of a user-fee based funding model is that the demand risk is generally transferred to the private party in these arrangements.

Disadvantages include the legitimacy issues surrounding charging for some services, as well as the possibility of reduced socio-economic return for the project (due to some users avoiding the road to escape paying toll-charges). Another very important disadvantage is the high return on equity capital required by private sector investors (due to their retention of demand risk). It should also be noted that, in some cases, the collection of tolls can be a significant additional cost, which might further impact the attractiveness of the project.

In user-fee based projects, it is important that the public authority assesses the willingness and ability of users to pay for the service, especially if tariffs need to be increased from current levels to meet revenue cash-flow targets. In many user-fee PPPs, the state will be required to subsidise (at least partially) the service in order to make it affordable to users. This subsidy can in turn impact the Value for Money of the PPP arrangement.

The following aspects are applicable for typical user-fee based PPPs:

- Only conceptual or baseline designs are necessary to finalise the standards and requirements to be included in the concession contract since the concessionaire is responsible for his own detailed engineering design (this is necessary since he must accept the risk for rehabilitation and maintenance);
- Private Concessions are generally awarded on the basis of the lowest toll tariffs received from the bidders.
- After the concession period the project is transferred back to the government in a pre-determined state (normally with minimum specified deflections, i.e. a new road);
- Private concessions, after contracts are concluded, minimise the administration and management burden on government for the full concession period.
- An independent engineer is normally appointed (and remunerated) jointly by Government and the Concessionaire to monitor compliance with specifications and standards.

2.5.2 Shadow tolling

Under shadow tolling, the government remunerates the private investor based on the degree of utilisation of the infrastructure asset (e.g. number and type of vehicles using the road) instead of the investor charging users directly. As the project funding stream is paid for by the state, this type of arrangement is

not user-fee funded but is directly related to the number of users of the asset or service. The advantage is that some of the demand risk is transferred to the private party, thereby incentivising the provider to have a well-functioning and attractive asset at all times. For this reason, shadow tolls have been quite popular on major roads projects in Western Europe.

The disadvantage of this type of approach includes the fact that some demand risk is retained by the public sector and the fact that infrastructure investment may not be rationally allocated (because motorists do not pay for the economic cost of infrastructure provision).

As the public authority will enter into payment obligations over the life of the Shadow toll contract, assessment of affordability (the ability of the state to make these scheduled payments) is a key consideration in the design of the project. Sometimes, options may need to be examined that combine user-fees with government service payments.

The following is applicable for Shadow Tolling:

- The full benefit of private sector involvement is obtained without the added cost of collecting tolls.
- Private sector must raise the financing and invest equity, but no tolls are collected physically.
- Government pays the concessionaire based on the actual traffic demand and tariffs determined during tendering stage.
- A secure source of funding, however, is required throughout the concession period from a source such as a fuel levy, or perhaps from bi-lateral and multi-lateral funding agencies.
- Shadow tolling, although sound in concept, are not very often used and few examples are available – none of them in Africa.

2.5.3 Availability payment

Availability payment-based contracts are similar to shadow toll contracts, but here the payment by the state to the private provider is not based on actual asset utilisation (number of users) but rather only on the time that the asset is available to users. In this type of contract, the demand risk is therefore retained by the state, but most of the operational risk is transferred (and the private provider is also still incentivised to have the asset operational at all times).

As in shadow toll arrangements, the key issue to determine in availability payment-based PPPs is the affordability of the project. The limited financial resources of most African governments have made availability payment and shadow toll-based PPPs somewhat unpopular on the continent.

However, if complemented by additional funding sources (notably donor appropriation), shadow toll-based PPPs from for example the Road Fund could prove attractive.

2.5.4 Other funding sources

It is important to note that in most development contexts, the following funding sources for the initial construction / rehabilitation costs of transportation assets may also be available:

- Loans from Development Partners, i.e. World Bank and European Union;
- Equity from the private sector, i.e. the concessionaires; and
- Loans from the private sector, i.e. locally or internationally sourced.

2.6 Project ownership variations

Although the abovementioned project arrangements are typical, it should lastly be noted that the project ownership structure (between public and private) can also differ. Specifically, the government can take an equity stake in the project or even execute the project without any private equity involvement. Some of these fully-publicly owned contractual forms come close to traditional procurement but retain aspects of PPPs when the project is delivered by a public Special Purpose Vehicle (SPV).

We discuss two main options in this regard:

- Government Concessions
- Public-Private concessions

2.6.1 Government concessions

The disadvantage of the high return required by private sector on equity capital can be eliminated by government concessions, such as State Toll Roads.4 Government concessions are similar to traditional public procurement, in that the bulk of project risk is retained by the government. Where these projects differ from normal procurement is in the way that they essentially create a new source of revenue, namely user-fees or tolls.

The following is applicable for Government Concessions:

- The government remains responsible for the project but appoint private sector operators to collect tolls on its behalf (all the risk remains with government);
- Detailed engineering designs and the subsequent construction and supervision is the responsibility of government for which normal transparent competitive bidding processes are used.
- The government is not tied to the specific proposals for a long period and have more flexibility for future improvements and changes to the network.
- The government contracts the services of experienced toll operators for medium term contracts to collect the tolls on its behalf.
- Government concessions do not reduce the administrative burden on officials but may even add to it.
- Government concessions are less expensive since no return is demanded by government and no taxes are payable – this translates to lower toll rates for the public.
- Also, since risks remain with Government the costs and the toll rates are lower - there is however no "protection" for the asset user (and payer of user-fees) to ensure that the revenue raised through tolling is invested exclusively in the tolled asset.

2.6.2 Public private shared concessions

Public Private shared concessions differ from full private concessions in terms of the risk transferred to private sector and the flexibility that is retained by government to subsidise toll tariffs and to cross-subsidise projects. The responsibility to collect tolls is basically disconnected, contractually, from the responsibility for the management of the asset. The following is applicable for Public Private Partnerships for tolls:

- Transfer all responsibilities for the management (initial improvement and maintenance) to the private sector during the duration of the concession, i.e. 25 to 35 years.
- Government remains responsible to collect tolls through a separate contract with a private sector toll operator.
- Only conceptual or baseline designs are necessary to finalise the standards and requirements to be included in the concession contract since the concessionaire is responsible for his own detailed engineering design (this is necessary since he must accept the risk for rehabilitation and maintenance);
- The concessionaire is not involved in the whole tolling process.
- After the concession period the project is transferred back to the government in a pre-determined state (normally with minimum specified deflections, i.e. a new road);
- Concessions, after contracts are concluded, minimise the administration and management burden on government for the full concession period.

[4] State Toll Roads are found in South Africa, specifically portions of the N1 (north), N2, and N3 roads, as well as the Gauteng Freeway Improvement Scheme which is currently being rolled out.

- An independent engineer is normally appointed (and remunerated) jointly by Government and the Concessionaire to monitor compliance with specifications and standards.
- The private sector still has to raise the required funding in the market but is not expected to contribute own equity (only guarantees);
- Public Private Shared Concessions are less expensive than full private concessions since less risk is transferred to the private sector. However, the private sector still requires a return and has to pay taxes (tax concessions from government is however a possibility) – this translates indirectly to higher toll rates for the public (which are levied separately by the Government) than under the Government Concession model.
- Public Private Shared Concessions are generally awarded based on the lowest annualised revenue stream required by the concessionaire during the concession period.
- Since the collection of tolls is not linked to the concession agreement, the Government keeps the flexibility to subsidise toll tariffs and to cross-subsidise projects. The traffic and revenue risk however remains with Government. This however should not be a problem in an established situation where the Government in any case has to raise revenue for the management of the remainder of the road network through taxes and road uses charges.

2.7 PPP Project development process

The PPP project development lifecycle encompasses a structured process through which a government or public entity collaborates with private sector partners to deliver public infrastructure or services. The typical full lifecycle is shown in the diagram below.

Figure 2-2: The PPP project development cycle (APMG International, 2016)

2.8 Anticipating the PPP structure of the ALHP

It is understood that the intent is for the highway development to happen through a PPP arrangement. It is anticipated that the project will have the following key characteristics:

1. The PPP modality will be a green-field Build-Operate-Transfer type arrangement funded primarily through direct user-fees (although it will probably include significant concessional finance to ensure affordable toll-rates).

2. The project will be developed and procured in three separate Lots, or transactions. The three Lots are shown in the figure below. Each Lot will entail a separate PPP transaction contracted to a separate private party. There will therefore be three separate procurement processes, although there might be some integration between these.

3. A dedicated project implementation unit (PIU) was established in 2019, to provide day-to-day executive management of the project and reports to ECOWAS Commissioner for Infrastructure. The PIU which is based at the ECOWAS Commission Headquarters in Abuja, Nigeria is responsible for administering and managing the study, in particular preparing procurement documents, managing contracts, planning meetings of the various Study stakeholders (Steering Committees, Study Delivery Team, etc.), and round table of development partners and potential private investors. It also plans and prepares disbursement requests, assuming responsibility for the administrative and accounting management of the Study.

4. Once the projects are operational, the contracts will be overseen by ALCoMA on behalf of the various national governments along the highway. In other words, ALCoMA will be the public party that contracts with one or more private parties.

SECTIONS	DISTANCE (KM)	AREA COVERED	DETAILED ROAD ITINERARY
Lot 1	**295.3**	Abidjan **(Cote d'Ivoire)**-Takoradi-Apimanim **(Ghana)**	Abidjan-Grand Bassam-Samo-Aboisso-Noe- Elubo-Apimanim
Lot 2	**466**	(Takoradi-Apimanim-Akanu) **Ghana**	Apimanim-Daboase-Elimina-Yamoransa-Mankessim-Mankessim By-pass-Budumburm-Medie-Miotso (prampram-Akatsi-Akanu-Noepe Bridge and Approach Road
Lot 3	**320.06**	Noepe **(Togo) –**Athieme **(Benin)** Lagos Eric Moore **(Nigeria)**	Noépé-Kpétazogbédji-Tsévié-Améléti-Tchékpo-Tabligbo-Agoméglozou-Afagnan-Gbtéta-Agoméglozou-Athieme (Agomey Glozoun bridge)-Zounhoue (NR2)-Houeyogbe (Crossroad-Zoungbonou)-Bopa-Dekanmey-Dekanmey-Tori-Houedo-Calavi Kpota-North of Cotonou by-pass-Seme (Crossroad)-Krake-Seme bor-der-Agbara-Iyana Era-Okokomaiko-Mile2-Eric Moore

Figure 2-3: Proposed Project Lots (Source: PIDA Database)

3. PPPS AND CLIMATE RESILIENCE

3.1 Introduction

Climate change, and specifically adverse climatic events presents a significant risk to infrastructure projects and the management of infrastructure assets. The other working papers under this assignment provide a detailed discussion on climate related risk to infrastructure, and how these risks can be physically mitigated (including through NbS). As a refresher, the figure below summarises the key climate related risks that transport infrastructure projects face. A more complete list of risks is included in Annexure 1 of this report.

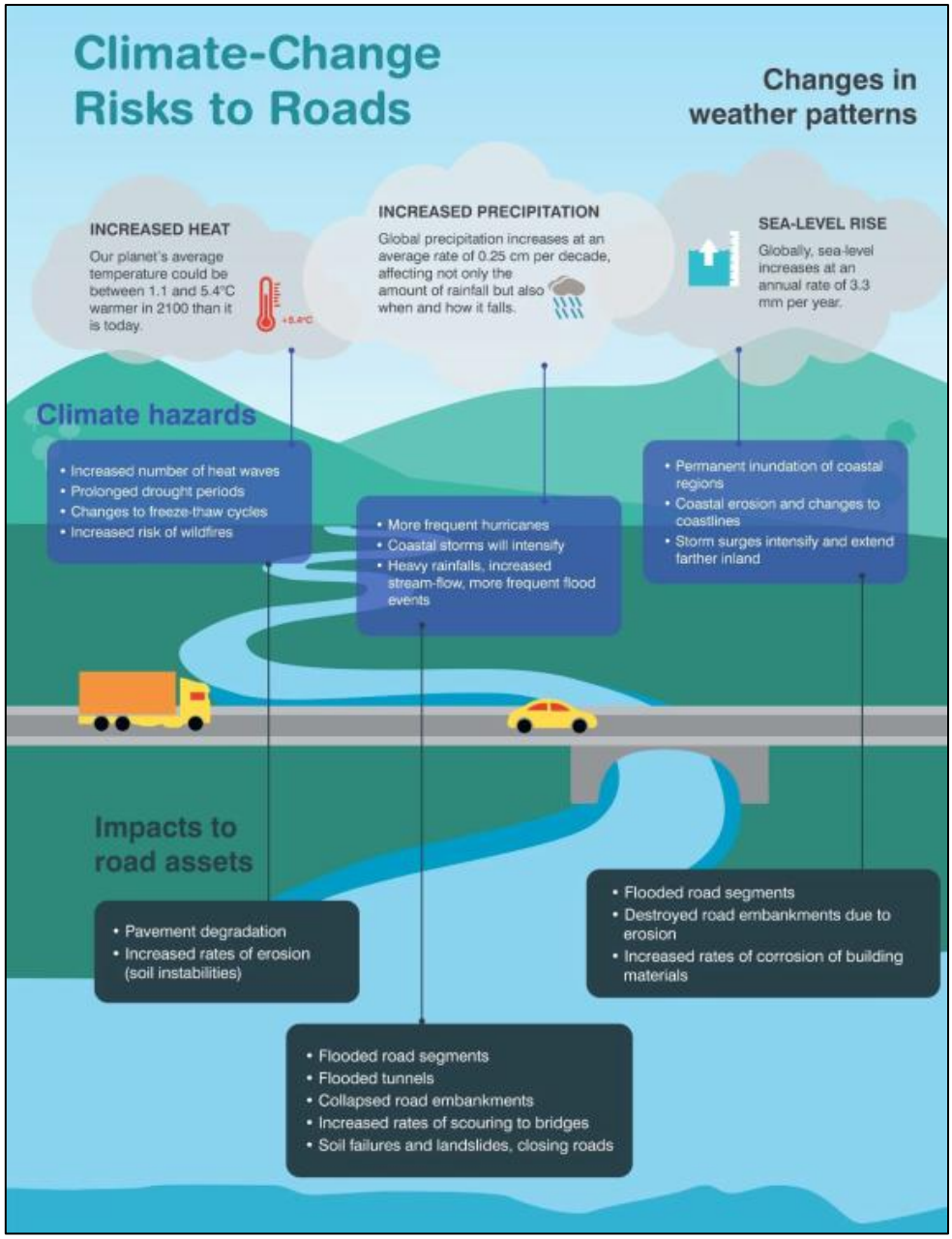

Figure 3-1: Climate change risks for roads (Source: WB 2022)

It is therefore critical that infrastructure developments incorporate climate resilience and adaptation measures. There are three broad adaptation approaches to reducing or mitigating the impact of these risks: Reducing exposure (making sure that the assets are located out of harm's way), reducing sensitivity (taking measures that reduce the susceptibility), and increasing adaptive capacity (increasing the ability of infrastructure to cope with and adjust to change, including NbS).

PPP arrangements in their nature are more conducive to accommodating adaptation measures than traditional infrastructure procurement methods. Not only are private parties typically incentivised to ensure the ongoing operational viability of the infrastructure in question, but it does so over the longer term, when climate impacts are increasingly likely to play out. In addition, since private parties are responsible for both the upfront design development and the downstream operations, it is assumed that they are able to integrate optimal resilience management actions into the initial design. In short, PPPs bring private sector funds, innovation, and expertise into climate-resilient projects, enabling governments to build infrastructure that can withstand climate impacts while also encouraging sustainable practices over time.

However, PPPs typically entail complex procurement processes and detailed extensive contracts to guide their implementation. As a result, accommodating resilience measures into these agreements can be a tricky process. As noted in the World Bank Climate Toolkits for Infrastructure PPPs (2022) *"for PPP projects in particular, there is the additional challenge of dealing with the lock-in effect of long- duration contracts, which increases the pressure of adequately assessing the cost and benefits of climate investments over the whole life cycle of the project while simultaneously managing climate uncertainty."*

3.2 How resilience is typically accommodated in PPPs

3.2.1 Introduction

At the heart of both climate resilience and the PPP delivery method and lies the concept of risk. In climate resilience this entails the increased disruption and damage risk due to changes in climate patterns and the increased likelihood of adverse climatic events. In PPPs this is related to risk transfer as the key driver of value for money as explained in the pervious chapter.

These issues come together in PPP agreements in the way that these risks are allocated to various parties. Traditionally this took the form of specifying how events should contractually be dealt with (e.g. force majeure or insurance). Increasingly the intent is to shift more climate risk to the private party through imposing resilience requirements on private parties (i.e. incentivising them to build in NbS in infrastructure design or specifying resilience in technical specifications). Even the contractual definitions are changing by narrowing the scope of climate related force majeure.

Contracting parties therefore typically have two options to ensure climate resilience in PPP projects:

- Option 1 (Output focused): Incentivizing contractors to invest in adaptation measures by transferring climate-related risks to them (including narrowing the definition of climate related force majeure).
- Option 2 (Input focused): Set specific climate resilience requirements for the design, maintenance, and operation of the infrastructure in the PPP contract.

These two options for accommodating climate resilience into PPP agreements are summarised in the figure below:

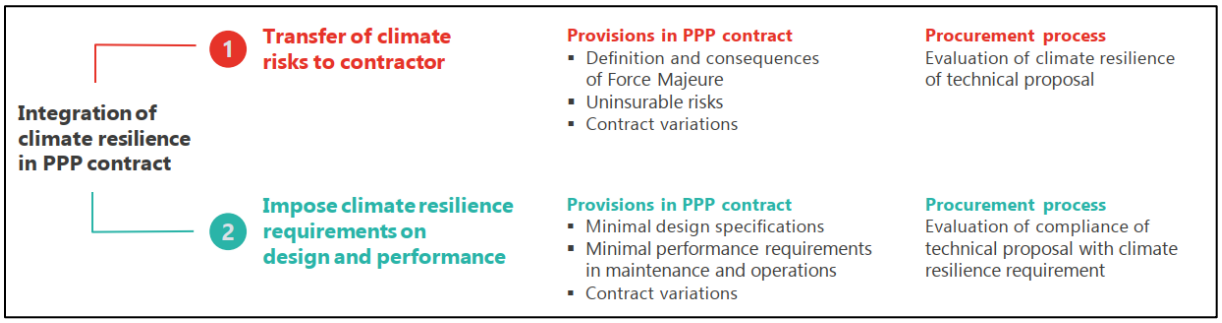

Figure 3-2: Contractual options for the reinforcement of climate resilience (Source: GCA 2024)

These two approaches—indirect incentives versus direct requirements—are not mutually exclusive and can be combined. For example, a minimal level of resilience could be required as part of the evaluation, effectively blending elements of both methods.

It is important to note that even if all climate risks are contractually assigned to the contractor (Option 1), the contracting authority may still face financial repercussions if the contractor underestimates climate risks or inadequately invests in resilience (leading to contractor bankruptcy).

3.2.2 Approach recommended for the ALHP

It is recommended that an input focused approach (Option 2) be employed for the following reasons:

- The immature PPP contracting environment in West Africa (will lead to contractors pricing additional risk very highly)
- Limited climate related information (in contrast to other more developed markets) and uncertainty on how this will change over time
- Immature and limited market for climate related insurance
- Fiscal constraints of the contracting parties make contractor failure a significant risk (limits step in ability)

The approach to be taken for the ALHP (simple risk transfer or detailed input requirements to accommodate resilience) will need to be confirmed during the feasibility studies of the three projects. The sections that follow provide some additional inputs that can be used in developing PPP projects that incorporate climate resilience.

3.3 Tools to incorporate climate resilience inputs for PPPs

3.3.1 Climate resilience inputs across the project lifecycle

The GCA propose a stage-based approach to incorporating Climate Resilience into a PPP project. This starts with project selection (to ensure the correct project), assessing climate related risks of the selected project, identifying resilience options, then incorporating these options into the PPP contract through various contractual mechanisms, and then lastly monitoring and supporting these changes during the operation term of the project. This is summarised in Figure 3-3 below.

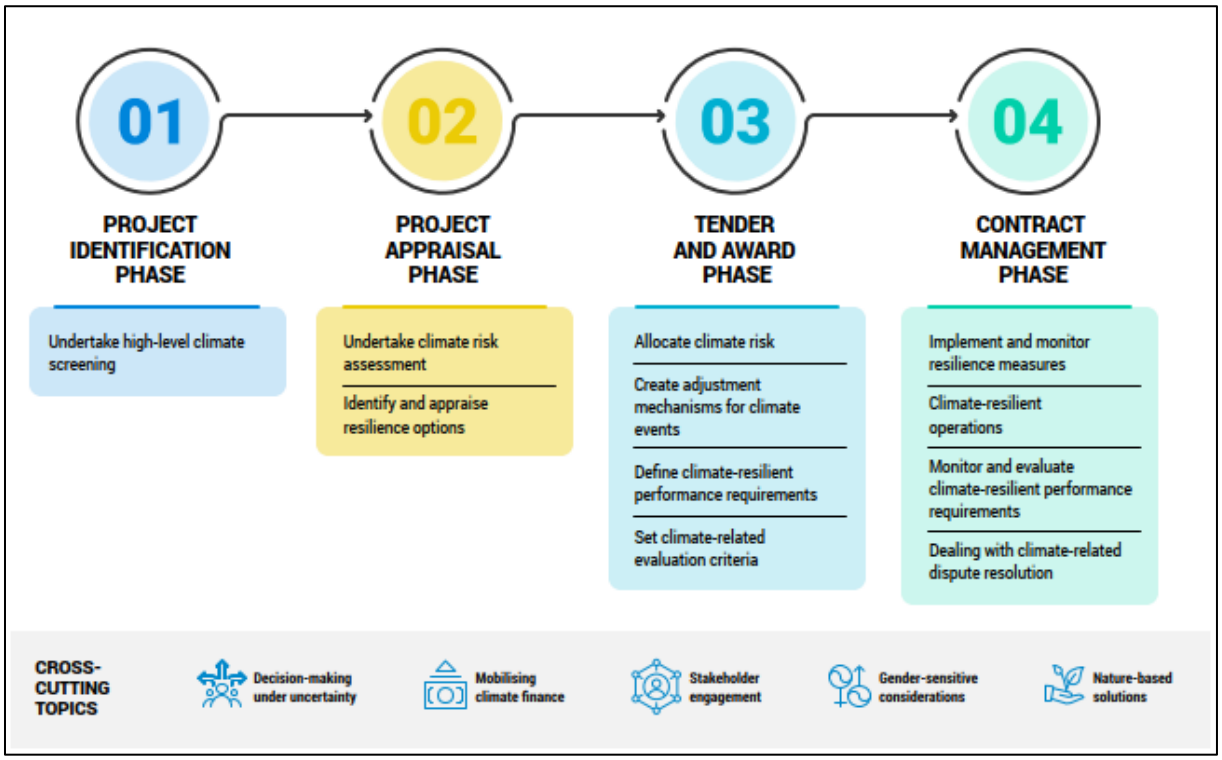

Figure 3-3: PPP project cycle and key intervention points for climate resilience (Source: GCA, 2025)

A similar framework is proposed by the World Bank (2019), identifying a number of actions required to incorporate climate resilience into the PPP project development process as summarised in the Table below.

Table 3-1: Actions to incorporate Climate resilience into PPPs (Adapted from World Bank, 2019)

Key action	Related tasks
Identify and assess natural disaster and climate change risks and impacts:	Screen site-specific climate and disaster risks during the early project planning stage Assess site-specific hydro-meteorological and geophysical risks during the feasibility study stage. Identify potential risk reduction measures including engineering designs and O&M measures to address climate and natural hazard events.
Define key disaster and climate risks:	Determine which natural hazards should be specified in a contract based on the results of risk assessment. Establish common understanding of disaster and climate risks between the public and private entities. Establish a clear definition of force majeure and quantitative criteria, where possible and practical, for invoking force majeure.
Establish a commercially viable disaster risk allocation framework	Develop a climate and disaster risk management framework based on risk assessment and established definitions. Reflect sector and project characteristics in risk allocation. Adopt an iterative approach to allocating risk to the private sector, depending on insurance and PPP market maturity. Identify and transfer insurable risks to the private sector. Address uncertainty posed by climate change via force majeure clauses and design adjustment triggers.
Develop flexible contractual mechanisms to ensure business continuity and commercial viability:	Prepare flexible measures to enable parties to take best possible actions to respond to disaster events. Establish relief mechanisms and their terms for application in the event of a disaster. Develop mechanisms that enable private developers to continue operating projects safely and profitably, over a reasonable term, in case of a force majeure event.

3.3.2 Risk allocation for Climate Resilient PPPs

As noted above, the allocation of risk is a critical element in PPPs and therefore is an important tool to ensure climate resilience in PPPs. Creating a risk allocation matrix that incorporates climate resilience in public-private partnerships (PPP) contracts involves identifying, assessing, and allocating climate-related risks between the public and private partners while integrating adaptive mechanisms (e.g., periodic reviews, climate-triggered renegotiation clauses). This matrix ensures that each party is accountable for specific risks while also clarifying responsibilities for mitigating and adapting to climate impacts. The matrix should ideally clarify responsibilities for mitigation and adaptation, define measurable climate resilience metrics (e.g., infrastructure durability under projected temperature rises), and involve stakeholders like local communities and insurers to address equity and residual risks. This ensures accountability while enabling flexibility for evolving climate impacts and other uncertainty factors.

The typical approach to develop a climate-resilient risk allocation matrix includes the following steps:

Table 3-2: Process to develop a climate-resilient risk allocation matrix

No	Step	Detailed actions
1	Identify Climate-Related Risks	Climate Hazard Identification: Assess the main climate risks relevant to the life of the project, such as flooding, extreme heat, drought, or sea-level rise, using climate models, historical data, and geographic analysis.
2	Analyze Each Risk's Impact and Likelihood	Conduct a risk assessment for each identified risk, evaluating both the likelihood of occurrence and the potential impact on the project. Quantify Risk Exposure: Estimate potential costs associated with climate impacts, like repair costs, downtime, or loss of revenue. Use climate resilience standards that should be defined at the start of the project and predictive modelling to establish a baseline for each risk.
3	Determine the Appropriate Risk Allocation	Allocate Based on Control and Mitigation Ability: Allocate risks to the party best able to manage and mitigate them. The Public Sector often takes on risks related to regulatory changes, land use planning, and long-term climate forecasting. While Private Sector generally assumes risks related to operational performance and project resilience within the agreed specifications. For certain risks like major force majeure events (e.g., unprecedented hurricanes or wildfires), consider shared or flexible arrangements that divide the costs. Allocate Financial Responsibility: Determine who will bear the costs if the risk materializes and clarify responsibility for preventive measures (e.g., flood barriers, storm-resistant materials).
4	Incorporate Adaptation and Flexibility Clauses	Flexibility Clauses: Include clauses allowing the project scope or design to be adjusted in response to evolving climate risks. For example, if new climate data forecasts a higher risk of extreme rainfall, the contract could include provisions for enhancing drainage systems. Adaptation Clauses: Specify who is responsible for implementing and funding resilience measures over the project life cycle (e.g., upgrading equipment or reinforcing structures). Cost Pass-Through Mechanisms: Allow the private sector to pass some costs to the public sector if climate adaptation costs rise significantly due to factors beyond their control.
5	Define Risk Mitigation Responsibilities	Set Clear Maintenance Standards: Establish standards for maintenance that include climate resilience requirements (e.g., drainage systems designed to handle extreme weather, routine inspections of flood barriers). Mandate Insurance Requirements: Specify that the private partner must maintain insurance against climate-related damages, helping to cover physical losses. Performance-Based Incentives: Introduce incentives for the private sector to invest in resilience measures. For example, the private partner might receive a bonus for maintaining infrastructure resilience beyond basic standards.
6	Include Monitoring and Reporting Mechanisms	Regular Climate Resilience Audits: Require both partners to conduct regular audits to monitor climate risks, assess the efficacy of resilience measures, and report on any needed upgrades or adjustments. Reporting on Climate Risk Indicators: Establish KPIs related to climate resilience and require the private partner to report on them periodically, ensuring accountability and continuous improvement.

No	Step	Detailed actions
		Independent Reviews: Include provisions for third-party reviews of the climate risk mitigation measures to ensure they are up to standard. These should also compare the adequacy of resilience measures to handle predicted future conditions as climate change models are updated.
7	Establish Dispute Resolution Mechanisms	Define Dispute Triggers: Identify events that may lead to disputes over climate risk responsibility, such as regulatory changes or extreme weather damages. Set Up Arbitration Clauses: Establish clear arbitration processes for resolving disputes related to climate risks, helping avoid long delays and ensuring quick resolutions.
8	Develop and Document the Risk Allocation Matrix	Matrix Structure: Create a table that lists: Risk Type, Description of the risk, Probability and Impact Assessment, Party Responsible (Public, Private, Shared), Mitigation Measures to be implemented, Monitoring Mechanisms for ongoing risk assessment. Review and Update: Make the matrix a living document by including a provision for periodic reviews to adjust risk allocations and mitigation measures based on updated climate data and regulatory changes.

An example of a Climate-Resilient Risk Allocation Matrix is sown in the table below.

Table 3-3: Example of a Climate-Resilience Risk Allocation Matrix (adapted from: Asian Development Bank, 2018)

Risk	Description	Responsible Party	Mitigation Measures	Monitoring Mechanisms
Flooding	River flooding during monsoon season	Public & Private	Flood barriers, enhanced drainage	Annual climate resilience audit
Regulatory Climate Policies	New emissions limits or materials standards	Public	Funding for retrofitting or compliance costs	Regulatory review, budget provisions
Sea-Level Rise	Gradual rise impacting coastal structures	Public	Coastal defenses, elevation adjustments	Periodic climate modeling review
Extreme Heat	High temperatures causing service disruptions	Private	Insulation, cooling technology upgrades	Quarterly maintenance checks
Climate Adaptation Costs	Unexpected costs for resilience upgrades	Shared (as per contract)	Shared funding pool or pass-through costs	Bi-annual financial review

This structured approach helps ensure that climate resilience is effectively integrated into PPP contracts, promoting sustainable infrastructure that can withstand the challenges posed by climate change.

3.3.3 Procurement mechanisms

A key step in embedding climate resilience into PPP projects is through ensuring it is incorporated into the selection of the private party. This is specifically important if an input-focused approach (see section 3.2.1) is followed. To this end, procurement documents need to incorporated climate resilience into various sections of returnable documents, ensuring bidders address resilience across all project phases. Below are the key areas in returnable documents where bidders should be prompted to include climate resilience measures:

Table 3-4: Summary of locations where bidders can be required to incorporate climate resilience

Returnable	Aspect	Change to ensure bidders incorporate climate resilience
Technical Proposal	Design and mitigation philosophy contributing to the project's ongoing resilience	Bidders should describe their overall approach to addressing and mitigating climate change impacts through the project's lifespan.
	Design Specifications and Approach	Bidders should describe their proposed climate resilience measures within the design phase. This can include material choices, construction techniques, and designs aimed at mitigating climate risks such as flooding, heatwaves, and storms
	Adaptation Strategies	Bidders can be asked to outline how they will adapt infrastructure designs to evolving climate conditions over the project's lifespan, including preventive measures for anticipated climate hazards.
Environmental and Social Management Plans (ESMP)	Climate Risk Management	Bidders should incorporate climate risk assessments within their ESMP, identifying climate hazards specific to the project location and detailing risk management strategies.
	Monitoring and Reporting Mechanisms	This section should require periodic monitoring of climate-related impacts, with an emphasis on resilience performance, reporting frameworks, and regular reviews to update strategies as necessary.
Operations and Maintenance Plan	O&M Resilience Practices	Bidders should outline how they will maintain resilience throughout the operational phase, including routine inspections, preventive maintenance, and resilience upgrades to handle climate stressors
	Resilience Performance Metrics	Request specific performance indicators tied to resilience, such as the durability of structures after extreme weather events and maintenance protocols for climate-proofing.
Risk Allocation and Insurance Provisions	Climate Risk Allocation	In the risk section, bidders should detail their proposed approach to sharing or transferring climate risks, including insurance arrangements, to cover potential losses from extreme climate events.
	Climate-Specific Insurance	Require bidders to outline any climate-specific insurance policies or bonds they will obtain to safeguard the project from climate-related disruptions.
Financial Proposal	Cost of Resilience Measures	Bidders should itemize the estimated costs of incorporating climate resilience measures, allowing evaluation of their financial approach to handling climate risks.
	Funding for Adaptation Strategies	Request a breakdown of funding strategies that bidders plan to use for future climate adaptations or resilience upgrades during the contract term, along with any additional cost-recovery mechanisms.
Risk Management Plan	Climate Risk Assessment	Bidders should perform a thorough assessment of potential climate risks and include risk mitigation strategies in their submission, with details on how they will address these risks across the project lifecycle.
	Contingency Planning	Require bidders to provide contingency plans for extreme weather events, outlining steps for recovery and repair that minimize disruption to operations and service delivery.
End-of-Term and Handover Requirements	Climate-Resilient Handover	Specify requirements for the project's handover condition, asking bidders to ensure that the asset will be climate-resilient at the end of the contract, capable of withstanding projected climate risks at the time of transfer to the public authority.

3.3.4 Contractual mechanisms

The implementation of PPPs is typically strictly guided by the PPP contract that is entered into between the public and private parties. To this end, it serves as an important platform to ensure climate resilience

requirements are incorporated into the delivery of the project. Several typical contract amendments align PPP contracts with climate adaptation goals, ensuring resilience and sustainability. They are recommended in climate resilience frameworks by institutions like the World Bank, OECD, and UNESCAP, which provide detailed guidelines on incorporating climate risk into infrastructure projects.

Here are typical clauses that are often modified to support climate resilience:

Table 3-5: Clauses that are often modified to support climate resilience

No	Clause	Aspect	Change
1	Scope of Work and Performance Requirements	Resilient Design Standards	Define specific climate-resilient materials and design standards that the private partner must meet, such as requirements for flood resistance, heat tolerance, or extreme weather durability.
		Adaptation Measures	Specify any adaptation strategies required to mitigate climate risks over the asset's lifespan.
2	Force Majeure	Expanded Definition of Events	Include climate-related events (e.g., severe storms, floods, wildfires) that qualify as force majeure, establishing which events would exempt the private partner from liability or trigger compensation. A typical revised Force Majeure clause is included in Annexure 3 of this report.
		Resiliency Thresholds	Clearly specify thresholds for what constitutes a qualifying event, to distinguish manageable climate events from extreme cases.
3	Risk Allocation and Climate Risk Transfer	Shared Risk Provisions	Define how climate risks are shared or transferred between public and private partners, including cases where additional funds or insurance will cover the costs of extreme climate events.
		Climate Insurance Requirements	Mandate specific climate-related insurance coverage or catastrophe bonds for the project to minimize financial disruptions from climate events.
4	Operation and Maintenance (O&M) Requirements	Performance Metrics for Resilience	Add metrics that track performance under climate stressors, such as infrastructure condition after extreme weather, to ensure that the private partner maintains resilience standards throughout the contract term. It is important to note that climate risk impact a number of standard project KPIs as included in Annexure 2.
		Periodic Resilience Upgrades	Outline requirements for periodic reviews and upgrades to adapt to evolving climate risks, such as rising sea levels or changes in rainfall patterns.
		Maintenance Services, Rehabilitation Works, Improvement Works	Adequately include budgets/ contingencies/ performance metrics for climate risk and resilience in all of these types of funding sources
5	Financial Clauses and Funding Mechanisms	Resilience Financing	Include mechanisms for funding resilience-related upgrades or repairs, possibly through reserve funds, grants, or government contributions
		Cost Recovery for Resilience Measures	Specify how additional costs for resilience measures are shared or recovered, to incentivize private partners to invest in adaptation.
		Price adjustment	It may be advisable to have a climate resilience index built into the price adjustment clause.
6	Monitoring and Reporting	Climate Impact Reporting	Require regular climate resilience assessments, including reports on how the infrastructure has performed in response to climate events

No	Clause	Aspect	Change
		Adaptation Compliance Audits	Implement compliance audits to ensure that the private partner adheres to resilience measures and adaptation strategies over the contract's term.
7	End-of-Term Provisions	Condition-Based Handover	Mandate that the infrastructure be handed over in a resilient state, capable of withstanding anticipated climate risks, ensuring that it remains functional and safe for future use.

3.4 Summary: Utilising climate resilience inputs in PPP projects

The typical areas where climate resilience inputs can be utilised in the PPP project cycle is summarised in Table 3-6. The Table also shows if this is applicable to the ALHP.

Table 3-6: Typical areas where climate resilience inputs can be incorporated into the ALHP PPP project development and implementation

Input	Project Identification phase	Project Appraisal and Development Phase	Procurement and Award Phase	Operations Phase
Project climate risk assessment and risk allocation information	Not applicable to the ALHP, since the projects have already been identified and approved.	Project Design and Technical Feasibility: Climate risk outputs help refine project specifications, ensuring infrastructure is built to withstand identified risks. Stakeholder Engagement: Use assessment results to inform discussions with stakeholders, particularly if risks could affect communities, operations, or the environment. Financial Structuring: Adjust financial models to account for costs related to climate resilience, such as contingency budgets or insurance premiums. Risk Allocation and Contract Structuring: Identify which party (public or private) is best equipped to manage specific climate risks.	Bidder Evaluation: During procurement, evaluate bidders based on their ability to address identified climate risks, their experience with climate-resilient infrastructure, or their proposed mitigation strategies. Technical and Financial Proposal Evaluation: Assess whether proposals align with climate risk recommendations, such as designs that withstand extreme weather events.	Construction Planning: Use climate risk data to adjust construction schedules, methods, and materials to avoid disruptions and damage from adverse climate events. Monitoring and Reporting: Set up climate-related KPIs for monitoring during construction and operation to ensure ongoing adaptation to emerging risks. Resilient Operations: Integrate climate risk strategies into O&M to reduce operational disruptions, optimize efficiency, and ensure safety. Performance Monitoring and Adjustment: Use climate risk outputs to monitor for climate-related impacts on the infrastructure. Adjust operations as climate conditions evolve over time.
Proposed adaptation measures and revised specifications	Not applicable to the ALHP, since the projects have already been identified and approved.	Financial Modelling: Include the cost of adaptation measures in lifecycle budgets. Risk Allocation: Specify adaptation responsibilities for public and private partners. Technical Specifications: Embed adaptation requirements in project design and performance criteria.	Bidder Selection: Evaluate bidders on their experience with climate-resilient infrastructure. Proposal Review: Assess proposed designs for effective adaptation strategies aligned with project climate risk assessment.	Resilient Construction Practices: Use materials and techniques that support climate resilience. Monitoring and Adjustment: Regularly check and adjust adaptation measures based on real-time climate conditions. Climate-Resilient Operations: Apply adaptation strategies to minimize operational disruptions. Monitoring and Risk Management: Track climate resilience KPIs and adjust O&M practices as needed based on emerging climate data.

Input	Project Identification phase	Project Appraisal and Development Phase	Procurement and Award Phase	Operations Phase
Technical specifications	Not applicable to the ALHP, since the projects have already been identified and approved.	During the initial planning and feasibility analysis, revised climate specifications help assess potential climate impacts and resilience needs. This includes identifying key vulnerabilities of the infrastructure and determining the extent of resilience measures required to handle future climate scenarios. Integrating climate resilience here allows for accurate budgeting and planning around expected climate risks.	At this stage, the contracting authority can include revised climate-resilient specifications in the tender documents, outlining specific resilience requirements that bidders must meet. By doing so, the authority ensures that contractors account for climate risks in their technical and financial proposals, promoting a competitive selection of contractors that can deliver on resilience goals. During design and construction, updated climate specifications are critical to guide the technical resilience of materials, structures, and systems being built. Here, the contractor can incorporate adaptations to withstand projected climate impacts. Regular updates ensure the design remains robust against more recent climate projections or regulatory changes that may arise during the construction phase.	Throughout the operations and maintenance phase, climate resilience specifications can be revised periodically based on monitoring data, emerging climate science, or observed changes in climate patterns. Adjustments at this stage ensure that ongoing resilience measures are maintained and adapted to any accelerated changes in climate, such as an increase in extreme weather events. Periodic contract reviews or mid-term evaluations provide an opportunity to revise climate specifications based on new climate data or lessons learned from actual climate-related incidents affecting the infrastructure. This stage can allow for contract modifications to enhance resilience standards or to allocate additional resources for emerging climate needs.

4. CLIMATE RESILIENCE INPUTS FOR THE ALDC

4.1 Introduction

This Chapter presents a summary of the results of the detailed Climate Resilience information on the ALHP as presented in several supporting documents and reports. The intent is that this information is shared to be used as inputs into the development on the three proposed PPP transactions on the ALHP. The three main inputs (aligned with the Terms of Reference of the current assignment) are as follows:

- Assessment of the anticipated climate hazards that the project will encounter (climate and risk assessment of the project.
- Proposed adaptation measures to mitigate the identified risks.
- Technical specifications to accommodate climate resilience.

4.2 Project Climate Risk Assessment

The climate stress test analysis undertaken as part of this study provided a broad evaluation of the expected climate related hazards and their impact on the road infrastructure. The initially identified hazards included fluvial flooding and pluvial flooding, landslides, high temperature, sea level rise and coastal erosion. Based on the Climate Stress Test (CST) Report, the hazards that pose significant risk to the highway include landslides, flooding, high temperatures, sea level rise and coastal erosion.

- Increased frequency of extreme temperatures can lead to road surface degradation, such as rutting and softening of asphalt, and, in some cases, pavement cracking due to heat stress. Concrete structures, including bridges, are also vulnerable, as extreme heat may cause expansion, resulting in potential structural stress and damage.
- Increased frequency and severity of flooding, which can cause extensive damage to road infrastructure, including road submersion, erosion, undermining of roadbeds, damage to bridges, culvert blockages, and disruption of drainage systems. Flooding also risks the stability of pavement and road substructures, leading to increased maintenance costs and road closures.
- Landslides, a secondary hazard associated with excessive rainfall, slope angle, soil type, and geology, may threaten road stability, particularly in hilly or mountainous regions. Landslides can result in road blockages, structural damage, and increased hazards for vehicles and pedestrians.
- Sea level rise (SLR) poses a significant risk to coastal roads, as higher water levels increase the likelihood of road inundation, especially during high tides and storm surges. This can lead to frequent flooding, submersion of low-lying roads, and accelerated degradation of road materials due to prolonged exposure to saltwater, increasing maintenance costs and potentially requiring costly elevation or relocation of vulnerable road segments.
- Coastal erosion, accelerated by rising sea levels and more intense wave action, threatens the stability and safety of roads near shorelines. Erosion can undermine road foundations, cause road collapses, and lead to the loss of protective buffer zones such as dunes and vegetation. Coastal infrastructure may need reinforcement or redesign to mitigate the effects of ongoing erosion and preserve road functionality and safety.

The CST integrates climate hazard, exposure, and vulnerability analyses, supported by data from global models and regional design guidelines. It focuses on primary hazards, such as precipitation and temperature changes, and secondary impacts, including landslides, flooding, and sea level rise. The approach evaluates risks using tools like the Highway Development and Management (HDM-4) model to simulate maintenance cost implications under different climate scenarios. Recommendations emphasize operational and engineering related adaptations, as well as Nature-based Solutions (NbS).

The key findings from the CST Report on the main climate related hazards include the following:

- Flooding:
  - A marked rise in rainfall depths between approximately 10.54 mm and 50.99 mm (depending on the region) is noted when examining 90th percentile values. Flood risk assessments reveal that critical areas like the Comoe and Oueme Districts are highly exposed to river flooding. Climate change is also likely to increase the frequency of flooding events with a flood currently considered to have a return period of 1:100 year becoming twice as more likely with a return period of less than 1:49 years by 2050 (median scenario) for SSP2-4.5 and 1:44 years by 2050 (median scenario) for SSP5-8.5.
- Landslides:
  - Although the overall landslide risk is low as the majority of roads are not in areas susceptible to landslides, regions like Greater Accra exhibit localized vulnerabilities, particularly with a projected 43% increase in maximum daily rainfall by 2060 under extreme scenarios. There is approximately 1,883 m of roadway in the high-risk category.
- Sea Level Rise:
  - While sea level rise has been observed to be increasing both globally and, in the region, only 7% of the overall highway is classified as being highly exposed. This is based on elevation thresholds, with areas below 2 meters above mean sea level (AMSL) considered highly exposed. Coastal sections, notably in Littoral (Benin) and Lagunes (Côte d'Ivoire), are at risk from sea level rise and storm surges. In Lagos and other low-lying regions, up to 23% of road sections could face permanent flooding risks by 2100.
- Extreme Temperatures:
  - Current design standards are inadequate for future temperature increases. By 2060, the three Lots could see a potential rise in average temperatures by between 13-14% in an extreme scenario, threatening pavement integrity and necessitating upgraded material standards. The most significant increase occurs in the Comoe district showing a significant temperature increase, with anomalies rising from 1.2°C to 3.99°C.
- Road Maintenance Costs:
  - Simulations suggest a 5.5% increase in maintenance costs under the more extreme climate change scenarios (i.e. 90th percentile for SSP2-4.5) although only limited impacts under the mean of future climate scenarios. Long-term strategies, including material innovations and enhanced drainage systems, are critical to offset escalating expenses.

Descriptions of the direct and indirect impacts of these identified climate related hazards are provided in Sections 3 of the Adaptation and Resilience Options Appraisal (AROA) Report. This report also includes and assessment of the proposed climate change adaptation measures that will also need to be incorporated into the considerations for the design of the overarching PPP framework for the project.

Many environmental hazards are inherently interconnected, allowing for a single, well-designed mitigation measure to address multiple risks simultaneously. For instance, the restoration and conservation of wetlands can significantly enhance resilience to flooding, sea level rise, and coastal erosion. Wetlands act as natural water retention systems, reducing peak flood flows and mitigating inundation risks in adjacent areas. Furthermore, wetlands buffer against coastal erosion by dissipating wave energy and stabilizing shorelines through vegetation root systems. As noted above, incorporating Nature based Solutions (NbS) as part of the critical adaptation requirements provides significant additional advantages, but these are in many cases not considered to be within the mandate of the road implementation agency. Deciding how to incorporate responsibility for NbS in the PPP frameworks is therefore an important consideration.

4.3 Proposed adaptation measures

As part of the Adaptation and Resilience Options Appraisal Report (AROA) a broad range of 'Green' and 'Grey' adaptation options have been considered, whereby 'Green' infrastructure generally includes Nature-based Solutions (NbS) such as coastal vegetation, grassed embankments, infiltration swales, and catchment management, while 'Grey' infrastructure describes the conventional engineering approach to construct hard infrastructure such as erosion protection or larger culverts to improve conveyance.

The different mitigation and adaptation options considered are presented in Table 4-1 below.

Table 4-1: Summary of all the Identified Potential Mitigation and Adaptation Options

Climate Hazard	Mitigation and Adaptation Options	Category
Fluvial Flooding Inundation of highway associated with surface run-off, and capacity of the river channel and associated structures	Bituminous surfacing	Green
	Slope Cuts	Green / Grey
	Contour Farming	Green
	Terracing	Green
	Afforestation	Green
	Vetiver Contours	Green
	Riparian Buffers / Floodplain Restoration	Green
	Natural Flood Management (out-of-channel)	Green / Grey
	Increase capacity of river-crossings	Grey
Sea Level Rise and Coastal Erosion Instability associated with high velocity flow of highway embankments	Mangrove Restoration and Afforestation	Grey
	Rock Walls/ Headlands	Grey
	Beach Nourishment and Sand Engine	Green
	Channel Widening	Grey
	Sea Wall Defence	Grey
Pluvial Flooding Inundation due to blockages and capacity limitation of the highway drainage **High Temperature** Point cracking, potholes and expansion of road due to excessive thermal expansion	Vegetated Channels (SuDS approaches)	Green
	Lined Channels	Grey
	Increase culvert capacity	Grey
	Heat-Resistant Materials	Grey
	Implementation of Cool Pavements	Grey
	Vegetation and Shading	Grey
Landslides Soil deposition on the road due to Instability of steep slopes and saturated soil conditions	Terracing / Re-profiling	Green / Grey
	Cut-off drainage	Grey
	Sub-surface drainage	Grey
	Ground Anchors	Grey
	Vetiver / Vegetation	Green
	Afforestation	Green
	Gabion Retaining Structures	Grey

The above list of potential adaptation options where further prioritized based on a multi-criteria analysis (MCA). The MCA applies a qualitative score to each solution with consideration of the overarching project objectives framed within the local context. This includes the following assessment criteria:

Cost, i.e. does the Option present a reasonable value in terms of both the initial capital cost and ongoing operational cost?

Technical performance, i.e. is the Option (or a combination of Options) able to withstand the magnitude of current and future climate hazards identified in the Climate Stress Test analysis over its intended life? This considers the overall impact of the mitigation solution, the timeframe over which the benefit is realised, and the resilience of the solution to withstand potential climate hazards.

Physical conditions, i.e. are there physical constraints that preclude the implementation of an option (e.g., topography)?

Practicality, i.e. does the technology and know-how exist to implement the option? (viability of the technology). Or does implementation of the option fall outside the scope of the proposed road construction project or beyond the authority of the implementing agency? (Locality of the solution in relation to the road). And will the solution be effective if implemented in a specific location? Or does it require a catchment wide intervention? (Scale).

Legitimacy, i.e. is the option politically, culturally, and socially acceptable? For example, could it result in physical or economic displacement of communities?

Equity, i.e. will the option benefit vulnerable groups and communities?

Flexibility, i.e. does the option allow for adjustments and incremental implementation and reiteration as understanding of climate risks and impacts improves over time.

Synergy/coherence with wider development objectives, i.e., does the option deliver other important benefits that render it a no- or low-regret Option regardless of future climate impacts?

Weightings were applied to each of the criteria at an internal workshop based on their perceived importance in the overall success of the Option. i.e. a 25% weighting was applied to 'Practicality' on the basis that it must be possible to implement this Option. Other criteria such as Flexibility were given a lower weighing on the basis that these are added benefits, rather than fundamental requirements.

Based on the results of the MCA, a shortlist of priority options has been selected for more detailed economic and cost-benefit analysis. The shortlisted adaptation options are presented in Table 4-2.

Table 4-2: Summary of Proposed Mitigation and Adaptation Options

Adaptation Option	Description	Hazard	Mitigation/Adaptation
Option 1: Adaptation in Hydraulic Structure Designs	This adaptation strategy focuses on enhancing hydraulic structures to improve their capacity to manage extreme rainfall events and subsequent floodwaters	Fluvial Flooding	**Increasing the Capacity of River Crossings (Existing & Proposed):** Expanding the dimensions of culverts and bridges to accommodate larger flood discharges and prevent overtopping. **Vertical Realignment of the Highway:** Raising the elevation of roads prone to frequent flooding, ensuring continued connectivity and reducing damage to transport infrastructure.
Option 2: Increasing the Resilience of the Road Design	Strengthening road infrastructure to withstand heavy rainfall and erosion risks	Pluvial Flooding, Coastal Erosion	**Concrete Surfacing in Flooding Hotspots:** Using durable, water-resistant materials in areas prone to frequent inundation to minimize road degradation and pothole formation.
			Stone Pitching on Embankments: Laying interlocked stones along embankments to prevent erosion, stabilize slopes, and reduce the impact of fast-flowing runoff.
Option 3: Coastal Vegetation Buffer	Implementing nature-based solutions to protect coastal infrastructure and ecosystems	Coastal Erosion	**Planting Indigenous Plants** that will reduce coastal erosion through stabilizing shorelines, and limiting the extent of coastal flooding
Option 4: Changing the Pavement Design	Enhancing road surfaces to withstand climatic extremes	Pluvial Flooding (increased moisture), High Temperature	**Choosing pavement designs** that can endure projected increases in moisture levels and extreme temperatures, reducing thermal cracking and moisture-induced damage
Option 5: Afforestation and Gabions for Landslide Mitigation	Implementing structural and ecological interventions to stabilize slopes and reduce soil erosion risks	Landslides	**Afforestation:** Planting deep-rooted vegetation to regulate soil moisture, improve infiltration, and enhance slope stability. **Gabion Retaining Structures:** Constructing wire-mesh rock-filled barriers to reinforce

			embankments, prevent soil displacement, and mitigate landslide risks.
Option 6: Catchment Restoration	Restoring degraded watersheds to enhance natural water retention, reduce runoff, and improve soil stability, thereby mitigating the risks of both flooding and landslides.	Flooding and Landslides	**Afforestation:** Planting deep-rooted vegetation to regulate soil moisture, improve infiltration, and enhance slope stability.

A high-level cost-benefit analysis was undertaken for each of the priority adaptation options for each Lot.

The results of the cost-benefit analysis for the adaptation options in response to increasing flood risk (i.e. Option 1, Option 2 and Option 3) are presented in Table 4-3. These results suggest a positive CBA for all Lots, but with the greatest benefit is for increased culvert capacity in Lot 3. The result of this analysis also shows the importance of considering the potential for co-benefits, particularly for NbS adaptation options.

Similar positive returns on investment were determined for the other proposed adaptation options indicating that it is important to consider these adaptation options in terms of the total life-cycle costs even if the initial upfront costs would be greater than a business as usual (BAU) scenario. While the analysis shows that some adaptation options have higher returns on investment (RI) it is recommended that multiple adaptation options should be considered as they all have significant benefits, and these will vary in different locations. The benefits will also be complementary rather than mutually exclusive.

Table 4-3: Cost-benefit analysis results for potential adaptation options for addressing increased risk of flooding (USD millions, Intermediate Scenario)

	Lot 1			Lot 2			Lot 3		
	Option 1	Option 2	Option 6	Option 1	Option 2	Option 6	Option 1	Option 2	Option 6
Total Investment	**17**	**21**	**5**	**66**	**9**	**22**	**7**	**6**	**5**
CAPEX	13	12	4	44	5	14	5	4	4
OPEX	4	9	1	12	4	7	2	2	1
Total Benefits for the Roadway	**46**	**36**	**30**	**12**	**9**	**8**	**90**	**84**	**70**
Avoided Direct Costs (e.g. Damages + O&M)	3.3	3.2	2.2	1.3	1.3	0.8	2.6	1.3	0.9
Avoided Indirect Costs (Diversion & Socio-economic impacts)	46	33	27	11	8	7	88	83	69
Total Co-benefits	**-**		**17**			**92**			**35**
Co-benefits – Provisioning Ecosystem services	-		6			53			26
Co-benefits – Supporting Ecosystem services	-		2			8			2

Co-benefits – Regulatory Ecosystem services	-		9			32			8
Net Present Value (NPV)	**32**	**15**	**41**	**-43**	**0.4**	**79**	**83**	**78**	**100**

4.4 Technical specifications to accommodate climate resilience

From a climate change and climate risk perspective, the critical design consideration to accommodate climate resilience are potential changes in temperature and extreme rainfall affecting hydraulic design (i.e. for road drainage, bridges and culverts) and for structural and road pavement design. For the Abidjan to Lagos Highway a Harmonisation of Design Report has been prepared that offers valuable guidance for standardised hydraulic, structural and pavement design across the three Lots and also includes some recommendations for improving climate resilience and accounting for climate change.

The nature of the PPP Framework must ensure that design and operation of the Abidjan to Lagos Highway takes into account the potential impacts of climate change, particularly in terms of expected increases in temperature and extreme rainfall that will contribute to increased magnitude and frequency of floods as well as the potential impacts of sea level rise and coastal erosion and the threat from landslides.

4.4.1 Design rainfall and design flood estimation

To account for the impacts of climate change, a 40% increase was recommended in calculated design flood flows for the 100-year return period derived from historical climate for Lot 1 and Lot 2. This adjustment reflected the increased risks posed by extreme precipitation events. Additionally, pre-analysis of flood levels was conducted for 10-, 50-, and 100-year return periods, ensuring that the hydraulic structures are designed to manage these scenarios effectively. Further to the design flood contingency mentioned above, freeboard heights were incrementally adjusted to provide additional safety margins:

- 0.5 m for sections up to 2.0 m high,
- 0.8 m for sections between 2.0 and 3.0 m high, and
- m for sections above 3.0 m high.

Several key parameters were also incorporated into the recommendations of the Harmonisation of Design Report to ensure effective water flow management and structural integrity, including:

- Drainpipe Gradient: Drainpipes crossing the road are designed with a slope of 0.5%, facilitating efficient drainage.
- Hydraulic Outflow Surface Area: The minimum surface areas for hydraulic outflows have been calculated to provide constructive design references that avoid constraints on the system's functionality.
- Culvert Water Height Limitations: For culverts, the maximum allowable height of water above the apex line is set at 1.20 times the culvert height (1.20xH), ensuring proper flow capacity and structural safety.

To enhance embankment stability and resilience, the following considerations were given:

- Material Selection: Moisture-resistant backfill materials were used, with stabilization via cement or lime where necessary.
- Slope Geometry: Slopes were designed based on soil geotechnical characteristics, with recommended slopes including 2V:3H for unconsolidated cuts and 2.5H:1V for embankments under 2 m. Reinforced geotextiles were utilized for embankments over 2 m.
- Slope Protection: Measures included NbS (e.g., grassing, tree planting), hybrid solutions (e.g., gabions, reno mattresses), and grey infrastructure (e.g., stone pitching).

To assess the adequacy of the proposed 40% contingency for design flood estimation, an evaluation of the potential impacts of climate change on the average maximum 1-day rainfall was conducted. As shown

in Figure 4-1, this contingency represents the upper bound of the projected changes in maximum 1-day rainfall due to climate change. The analysis indicates that the 40% increase aligns only with the 90th percentile projections under the high-emission scenario (SSP5-8.5). This suggests that the proposed contingency is a conservative measure, designed to account for extreme scenarios. While this approach is appropriate for design considerations requiring minor adjustments, such as upsizing the capacity of small culverts, it may result in prohibitively high costs for larger hydraulic structures, including bridges.

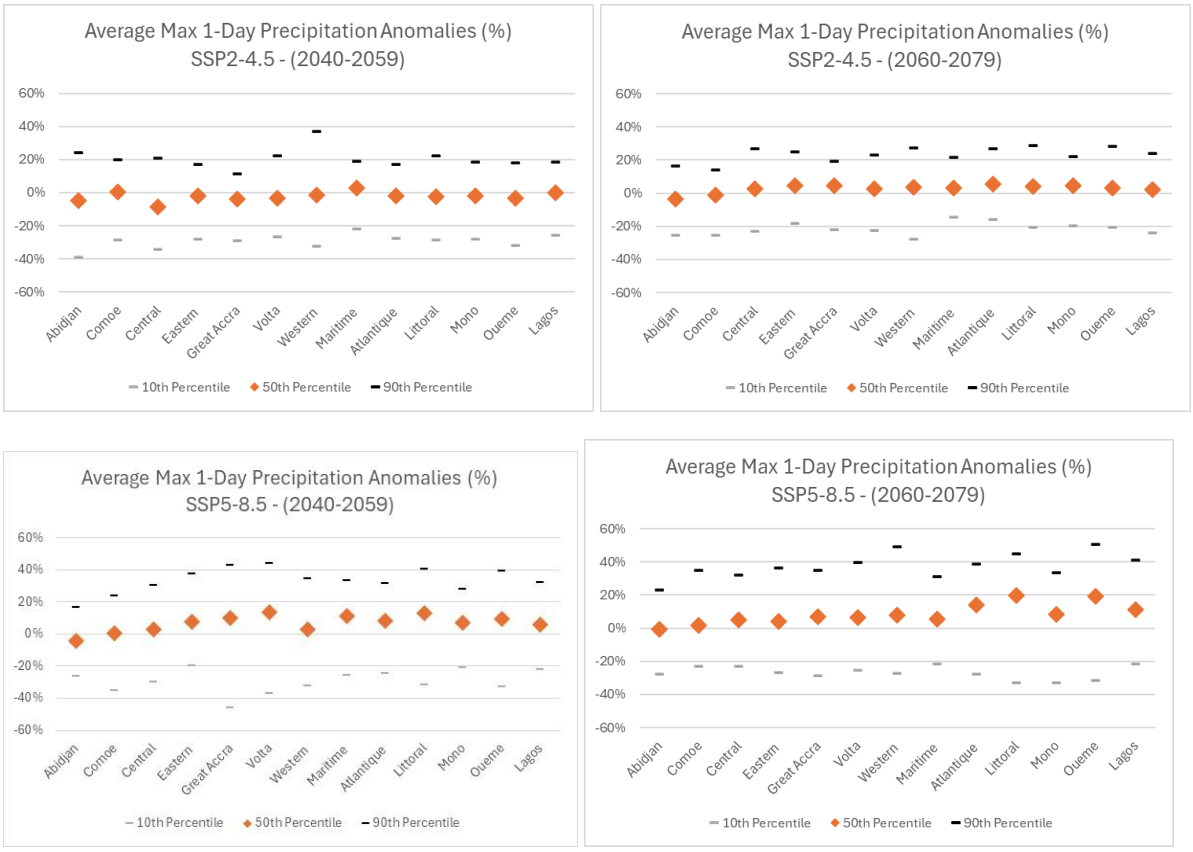

Figure 4-1: Climate change impacts on Average Maximum 1-Day Precipitation for individual districts (Source: CCKP)

Increasing the design capacity for road drainage, culverts and bridges will increase the overall capital cost requirements for the highway and will vary significantly based on the individual details and including whether a new road or upgrading of existing road and hydraulic structures. The methodology to calculate the CAPEX for increasing the capacity of culverts and bridges involves several key authors' assumptions[5]. The analysis is based on cost estimates for Lot 2 per km for bridges and culverts. This is because costings for Lots 1 and 3 lump culverts and bridges with other infrastructure while Lot 2 costings include line items for bridges (river and valley crossing) and culverts along with the length and cost of each bridge in the detailed design study for Lot 2. The length of half of the bridges was provided in the design study for Lot 1. The remaining bridges were assumed to have an average length of 60m. This was multiplied by the number of bridges in each Lot and the cost per km. Similarly, an assumption about the length of each culvert (6m) was made for Lots 1 and 3 and multiplied by the number of culverts and cost per km.

An additional contingency of 30 to 40% for flood design estimation was assumed to cost an additional 20% against the preliminary design CAPEX estimates. This means that the total cost of culverts and bridges was multiplied by 20% to estimate the cost of the contingency per Lot. Table 4-4 shows the number of bridges and culverts in each Lot and the estimated additional CAPEX required for adaptation.

[5] Authors assumptions are applied based on expert opinion in light of limited data available. In all instances where Authors' assumption is required, a conservative estimate is applied.

Table 4-4: Estimated Additional CAPEX Requirements for Increased Bridge & Culvert Capacity (USD 2024)

	Lot1		Lot2		Lot3	
	Bridges	Culverts	Bridges	Culverts	Bridges	Culverts
Number of units	12	40	27	468	11	142
Cost per km (USD)	41 870 000	627 530	41 870 000	627 530	41 870 000	627 530
Total length (km)	1.822	0.24	6.5	2.3	0.66	0.852
Additional CAPEX for Adaptation (USD)	15 287 549		54 719 664		5 633 771	

4.4.2 Temperature design standards

In terms of recommended temperature thresholds to be used for design of the Abidjan to Lagos Highway the Design Harmonisation Report recommends a range from a minimum of 15 ℃ to maximum of 40 ℃.

Analysis of the future climate scenarios for three locations along the route suggest that there is a very high likelihood that the upper temperature threshold will be exceeded. By 2060 the 40 ℃ threshold could be exceeded by up to 17% of the time in Abidjan and 9% of the time in Greater Accra (Table 4-5). These adjusted values will need to be take in to account during the design and upgrading of the highway.

Table 4-5: Percentage of time that a maximum of 40℃ is exceeded under current and future climate scenarios

Location	Present Day	2040		2060		2080	
		Lower	Upper	Lower	Upper	Lower	Upper
Abidjan	5.04%	6.99%	10.96%	8.94%	16.88%	11.51%	32.41%
Greater Accra	0.10%	2.28%	4.31%	4.46%	8.51%	6.57%	17.43%

Recognising that this upper temperature thresholds is potentially already been exceeded around 5% of the time in Abidjan this would represent a doubling of the number of days above this critical threshold. This could have implications on the integrity of the pavement and structural design and as a result it would be worth considering high level of design standards for temperature that would then need to be progressively increased into the future during periods of maintenance and refurbishment of the road.

The expected change in maximum daily temperature by 2040 along the highway are shown in Figure 4-2.

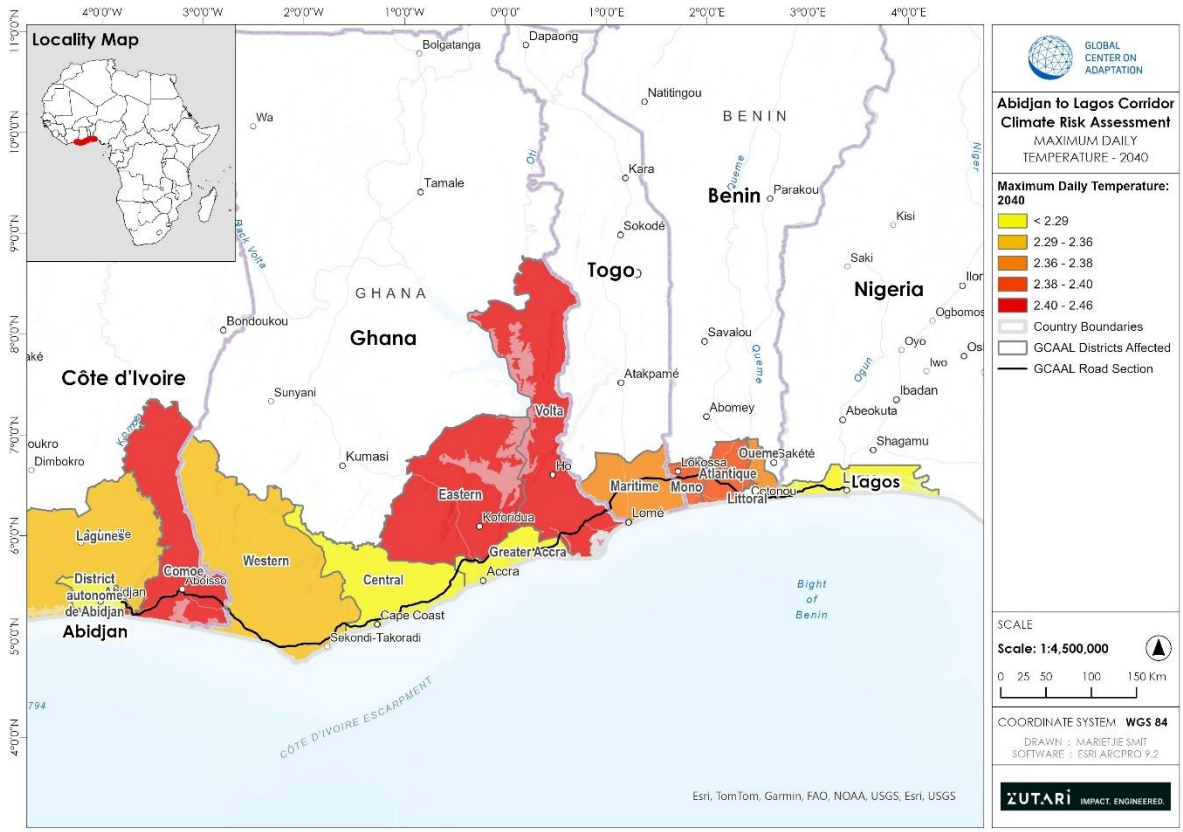

Figure 4-2: Expected increase in the average maximum daily temperature by 2040 (Ensemble Mean, SSP2-4.5)

4.4.3 Increased road operation and maintenance costs

The CST Report showed that climate change will most likely result in increased road operation and maintenance costs. This is mainly as a result of higher temperatures and increased frequency of flooding. These additional costs will need to be accounted for by the roads concessionaire in terms of maintaining the highway in an optimal condition. An initial indication of the potential impacts of climate change on road maintenance costs were determined using the HDM-4 model based on data available for Lot 3.

Broadly, two scenarios were modelled in HDM-4. The first is a base climate scenario which assumes no change in the climate condition for the period 2022 to 2070, along with the other inputs described above.

The second scenario, namely the climate impact scenario (SSP3.4-5 at the 90th percentile), is based on climate information described in the CST Report, for the period 2022 – 2039 (same as base climate scenario); 2040 – 2059, and 2060 – 2070 – although the 2060 to 2070 period has not been included in the Results.

While the analysis was conducted for LOT 1, LOT 2 and LOT 3, additional work is required to produce reliable results for LOT 1 and LOT 2, therefore LOT 3 only was considered for this initial reporting. The scenarios assume the same maintenance interventions as documented in the design and economic analysis reports provided for the Abidjan to Lagos Highway, but with relaxed triggers to allow for a less constrained approached to maintenance implementation based on pavement conditions throughout the analysis period. The maintenance regimes may be different simply by the frequency of the need for intervention caused by the climate. The interventions assumed are indicated in more below.

Although various simulations were conducted the preliminary results of LOT 3 for climate conditions (SSP2-4.5) at the 90th percentile are presented below. The results indicate that over the analysis period, the maintenance cost of the climate impact scenario is greater than that of the base climate scenario.

It is important to note that the maintenance cost for the base climate scenario and climate impact scenario is the same for the period 2022 – 2039 and only start to diverge after 2040. This is because the expected completion date for the new road is 2030 and typically for the first few years (assumed to be 10 years) of life the pavement is not particularly sensitive to climate stressors. Thereafter, the change in the

pavement deterioration rate as a result of the adjusted climate input results in a triggering of maintenance interventions that differ from the base climate scenario (for the period 2040 – 2059).

The resulting average annual maintenance cost for both scenarios is presented in Figure 4-3 where the divergence in annual cost, as a result of maintenance, is reflected. Also, shown in Figure 4-3 are the trend lines associated with these scenarios. The trend lines indicate an upward trend of cost in both scenarios, with the climate impact scenario's gradient being steeper and therefore the rate of change greater. What this implies is that over time, should the climate impact persist, that maintenance cost in a changing climate would continue to be greater relative to a scenario where the climate remains unchanged.

In terms of the alternative future climate scenarios, the assessment of potential climate impacts shows that the change in precipitation (moisture), which is the primary driver in the rate of degradation for the road pavement, does not vary significantly between the SSP2-4.5 and SSP5-8.5. There is also very little change, and in some cases as reduction, in precipitation for the 10th percentile and 50th percentile, which would explain why we see very little impact on the road maintenance cost for these other scenarios.

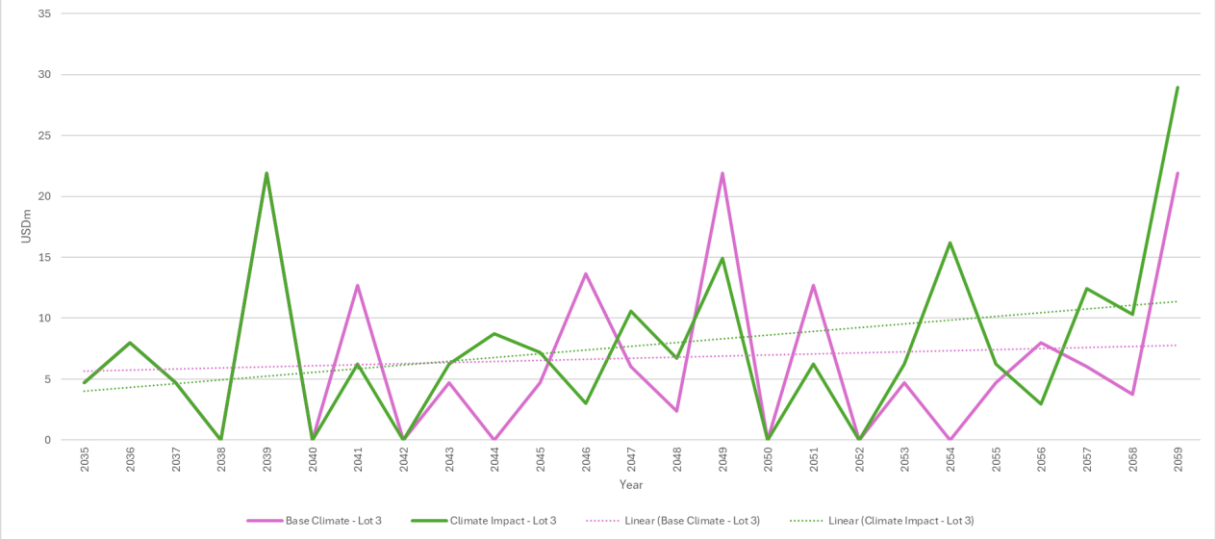

Figure 4-3 LOT 3 Maintenance cost (undiscounted) showing annual costs under base climate and adjusted scenario

Similar to Figure 4-2, and with the same simulation outputs, Figure 4-2 presents the cost streams using a simple moving average (SMA) of 5-years, which allows for a smoothing of the data over time. In Figure 4-2 it is evident that the difference in cost is greater in later years of the analysis due to climate change.

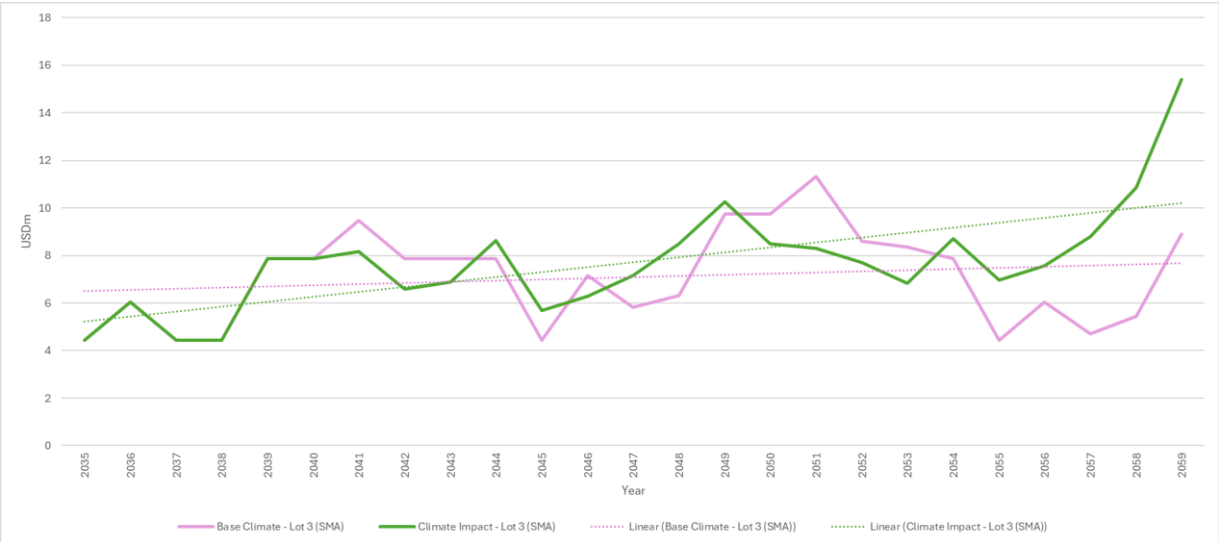

Figure 4-4: Maintenance cost 5-year SMA (undiscounted)

While both figures above present undiscounted costs, it is important to understand these in present day terms – and as is required in economic appraisal. Table 4-6 presents the NPV of the maintenance cost at various discount rates. Said table illustrates a range of 1.4% to 5.5% difference in cost at a discount rate of 12% and 6% respectively. In other words, in today's monetary terms (and at a 6% discount rate), the total NPV cost of maintenance in a scenario where climate change is accounted for, is 5.5% greater than that of a scenario where climate change has not been taken into consideration.

Table 4-6: Net Present Value (NPV) of road maintenance costs due to impacts of climate change for Lot 3.

Discount rate	NPV of maintenance cost (2022 USDm)	% Difference
6%	2.84	5.5%
9%	0.91	3.0%
12%	0.25	1.4%

5. INSTITUTIONAL STRUCTURE TO SUPPORT THE INTERVENTIONS

5.1 Introduction

The sections above present the options for incorporating climate resilience into the development of the Abidjan-Lagos Highway project. It should be noted that any guidance will be operationalised through individuals and organisations that oversee the implementation of the project. As such, it is important to briefly consider the institutional structure that is required to support the recommendations made.

This section explores the institutional aspects required to support climate resilience along the highway. The aim is not to develop a preferred institutional structure for the implementation of the development of the highway, but rather to augment the structure that is already being proposed. The assessment was somewhat constrained by the limited information available (regarding the institutional structure for the development of the highway) at the time of this report.

The section firstly includes a desktop review of the status of the various institutions along the highway, as a basis for identifying proposed institutional interventions required.

5.2 Overview Of National Institutional Frameworks Supporting PPPs Along The Highway

The implementation of the ALHP will entail PPP projects that span the seven countries of the highway. To effectively support PPPs in a country, a set of institutional elements is crucial. These elements create a favorable environment for PPPs to thrive and ensure their successful implementation. Some of the key institutional elements required to support PPPs include:

- A clear Legal and Regulatory Framework
- A centralized PPP Unit/Agency
- A PPP policy and framework that guides project development and implementation
- Public sector capacity to guide these projects and be a counterparty to private bidders

A detailed review of the institutional frameworks in the respective countries is beyond the scope of this assignment. However, a high-level desktop analysis is included in Annexure 4 of this report. From the analysis, it is clear that the institutional structure to support the implementation of PPP projects (and therefore the related climate resilience investments) has a number of key shortcomings. This includes inconsistent or non-existent PPP legislation, PPP guidelines, and public sector capacity to develop and oversee projects at a national level. In addition, the multiplicity of functions by various public bodies will complicate project approval, implementation and oversight. It can also contribute to potential for increase in the project scope, duplication of effort, additional costs and delays in the final delivery of the project.

5.3 Key Highway Institutions responsible for implementing the ALHP

5.3.1 Key role players

The key institutional enablers are as shown in Figure 5-1 below.

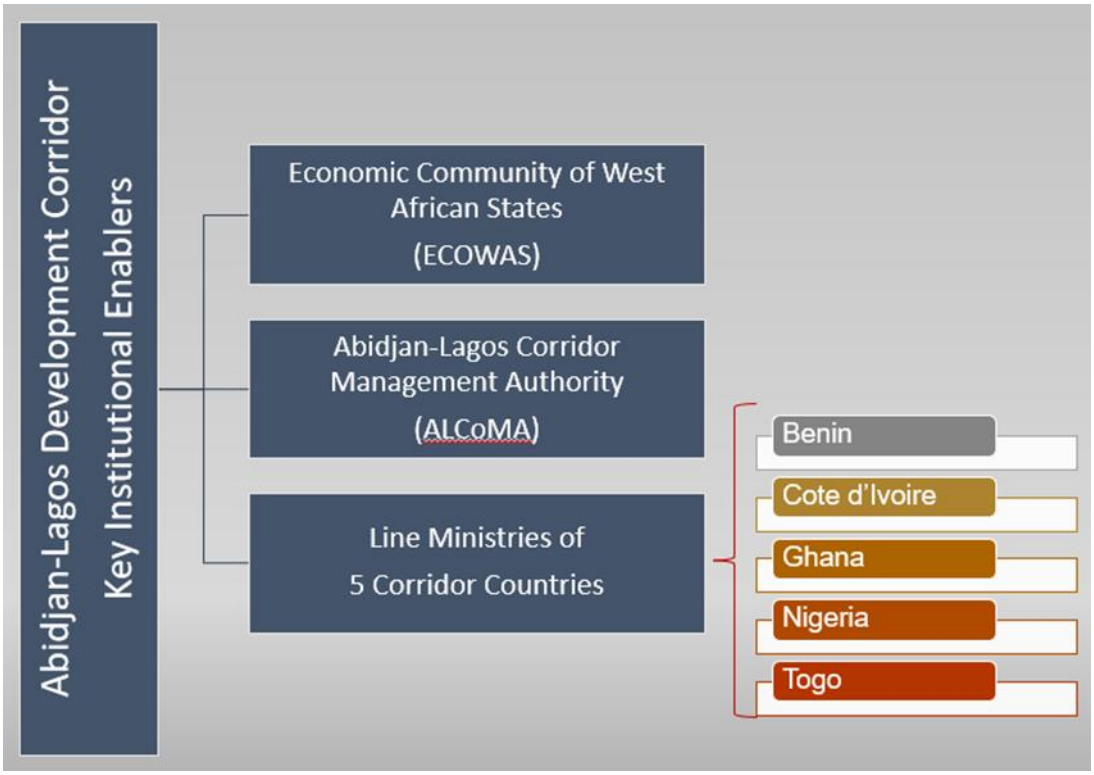

Figure 5-1: Key Institutional Enablers on the ALDC

A brief description of the key institutional enablers follows.

5.3.1.1 ECOWAS

The Heads of State and Government of fifteen[6] West African Countries established the Economic Community of West African States (ECOWAS) when they signed the ECOWAS Treaty on the 28th of May 1975 in Lagos, Nigeria. In 2007, ECOWAS Secretariat was transformed into a Commission, with a vision of "a borderless region where the population has access to its abundant resources and is able to exploit them through the creation of opportunities under a sustainable environment".

The aim of the Community is to promote co-operation and integration, leading to the establishment of an economic union in West Africa in order to raise the living standards of its peoples, and to maintain and enhance economic stability, foster relations-among Member States and contribute to the progress and development of the African continent. In line with this aim, ECOWAS is implementing critical and strategic programmes that will deepen cohesion and progressively eliminate identified barriers to full integration.

5.3.1.2 Abidjan-Lagos Corridor Management Authority (ALCoMA)

ALCoMA was created by the Abidjan-Lagos Corridor Treaty and signed by the Heads of State of the five Corridor Countries (e.g., Benin, Cote d'Ivoire, Ghana, Nigeria and Togo).

5.3.1.3 Corridor Country Line Ministries

A detailed review of the relevant line ministries in each of the respective corridor countries are indicated below, with respective ministerial responsibilities.

[6] The fifteen ECOWAS Member States are Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Sierra Leone, Sénégal and Togo.

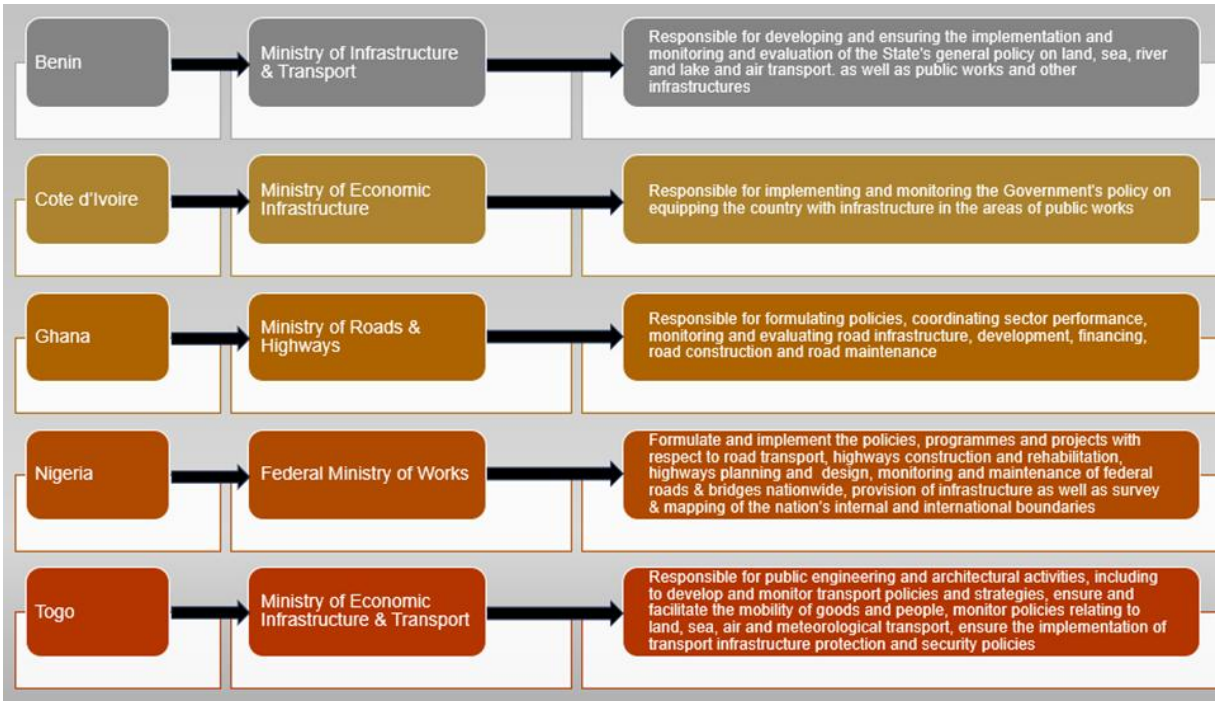

Figure 5-2: Summary of Line Ministries responsible for the ALDC project

5.3.1.4 Governance bodies

Between the key enabling role players, three governance bodies have been identified to carry out the primary functions of execution, management, implementation, coordination, facilitation and oversight.

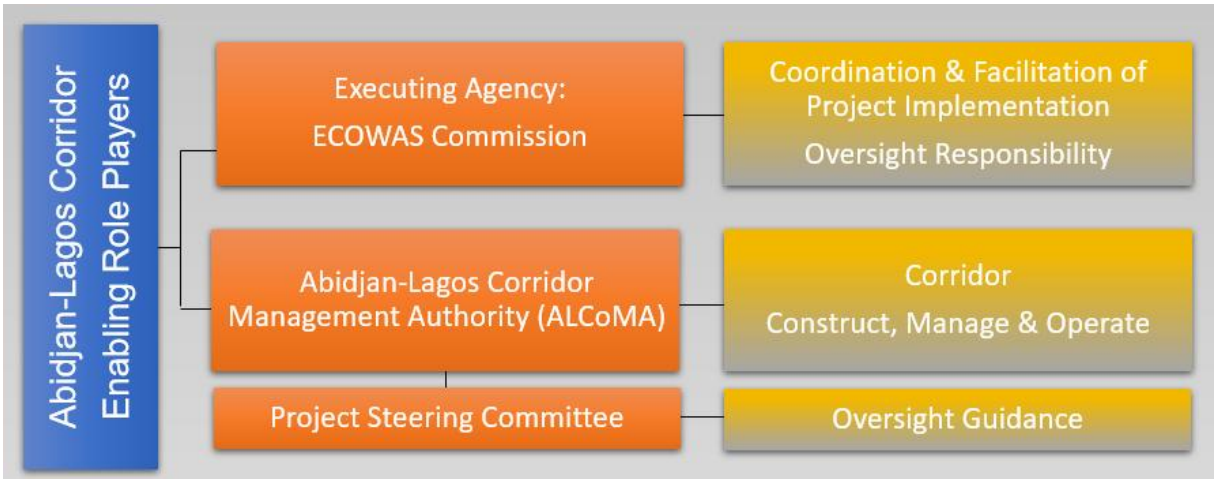

Figure 5-3: Enabling organisations for the ALDC project

5.3.2 Abidjan-Lagos corridor institutional structure

Against the afore-mentioned background of key institutional enablers and governance bodies, the institutional structure for the execution, management, implementation, coordination, facilitation and oversight, is interpreted as follows:

- ALCoMA will have Supranational Status, with the respective responsibilities to construct, manage and operate the Abidjan-Lagos Highway. In addition, ALCoMA will also be responsible for several other duties, as pertaining to Articles 2 and Article 9(1) and 9(2) of its mandate:
- The five (5) Presidents also designated the ECOWAS Commission to coordinate and facilitate the implementation of the Project. In this regard, the Commission through its Department of

Infrastructure is the Executing Agency for the project, under the supervision of the Commissioner for Infrastructure.

- All functions being performed in the interim by the Steering Committee and all other Stakeholders, shall automatically vest in ALCoMA.

This is summarised graphically in the figure below:

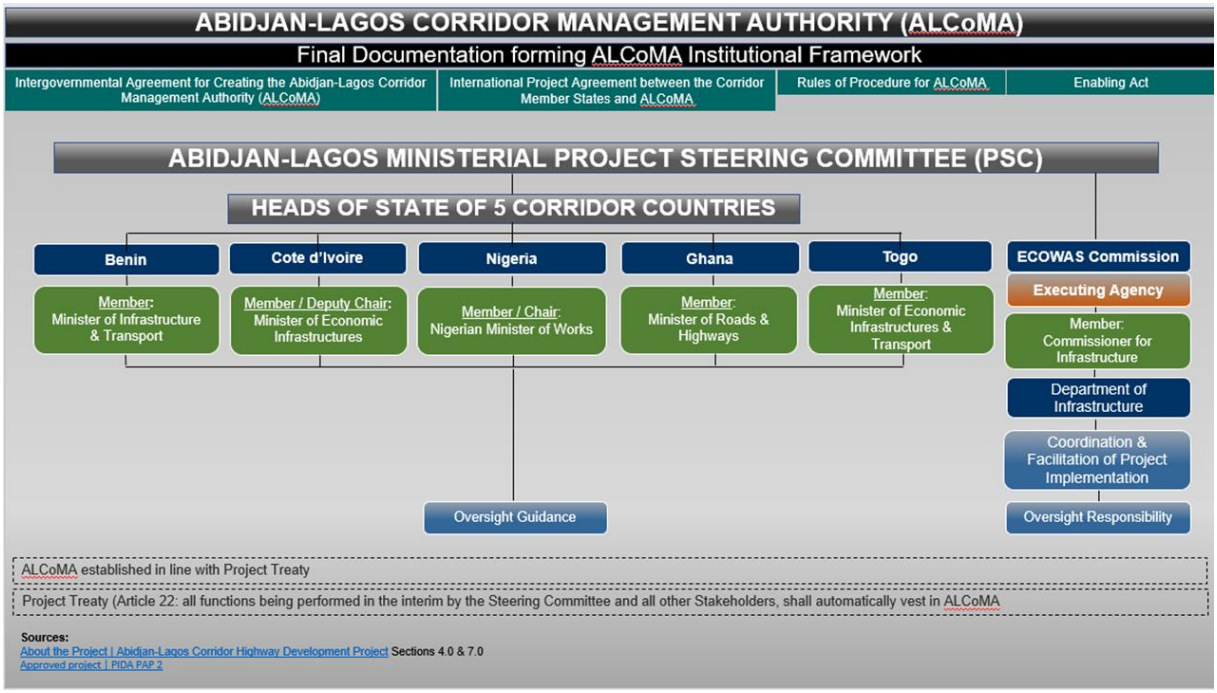

Figure 5-4: Abidjan-Lagos Corridor Institutional Structure

5.4 High level conclusions

The shortcomings of the national level institutional structures have already been highlighted. It is assumed that the implementation of the projects though supra-national entities (ALCOMA and the Task Team) will to some extent cover for these deficiencies. Unfortunately, it is not clear what the status of these bodies are, and to what extent they have either the legislative mandate or the institutional capacity to oversee the ALDC project.

Moreover, the projects will require buy-in and support in each geography, so significant capacitation will be required to ensure the projects can be seamlessly implemented. Although significant process has been made in recent years in the respective countries with respect to development of PPP frameworks and institutional set-ups, further interventions are required for improved implementation of PPP-related operations. Public sector institutions can adopt a range of structural, policy, and operational changes to strengthen climate resilience in public-private partnerships (PPPs), most notably interventions in the institutional environment.

5.5 Institutional interventions recommended

Against a backdrop of the relevant literature and documentation considered for this report, the following institutional interventions are recommended, specifically for relevant Line Ministries and its relevant PPP units as overseeing agencies for PPP implementation in the respective countries:

5.5.1 Policy and regulatory framework:

- Relevant institutions responsible for PPPs need to ensure that the required PPP policy and legal frameworks are in place to enable PPP implementation with the required incorporation of the

necessary climate resilience mandates, standards and procedures into the respective project lifecycle phases.

- Strengthening of existing PPP frameworks to enhance guidance to line ministries and other relevant stakeholders.
- Increased engagement to ensure comprehensive understanding of required inputs into implementation and execution of PPP projects, including the introduction of climate resilience into PPP projects.
- Include climate adaptation clauses that allow for project adjustments in response to climate-related impacts, creating flexibility to modify terms, project scope, or funding arrangements as needed.
- Foster inter-agency cooperation to align policies and funding streams across sectors (e.g., transport, water, energy) that are impacted by climate change.

5.5.2 Institutional capacity:

- Invest in increased institutional capacity within the respective line ministries of the respective corridor countries, to provide direct and pro-active in-country involvement and contribution to ALCoMA, to ensure optimal in-country project delivery.
- Establish climate resilience indicators and require regular reporting on these metrics to evaluate the performance of PPPs in building climate resilience.
- Develop clear guidelines for sharing climate risks between public and private partners, ensuring appropriate risk distribution in the event of climate-induced disruptions.

5.5.3 Capacity building:

- Institutional skills development in PPPs for enhanced understanding of the PPP frameworks, principles, delivery models and development processes.
- Institutional skills development in climate change in general, how climate changes impact transport infrastructure, how climate resilience can be incorporated into transport infrastructure and knowledge of respective climate resilience tools that can be applied to incorporate climate resilience into PPPs and related transport infrastructure projects for implementation.

5.5.4 Climate data and information sharing platforms:

- Creation of shared databases, accessible by ALCoMA and the respective corridor countries, to enhance and support shared knowledge on climate-related issues with live climate data, hazard maps, climate vulnerability studies and Abidjan-Lagos highway climate vulnerable hotspots.
- Creation of database interactive communication channels through which any relevant information can be shared and discussed between ALCoMA, the respective corridor countries and all other respective stakeholders.

5.5.5 Stakeholder engagement:

- Engage local communities in the planning and implementation stages of PPP projects to ensure that infrastructure is designed with local climate conditions and socioeconomic factors in mind.

6. CONCLUSION

The purpose of this report is to give recommendations for how climate change related risks can be incorporated into the planned Public Private Partnership (PPP) arrangements for the Abidjan-Lagos Highway project. The focus is specifically on how the future Private Parties can support the development of Climate Resilient infrastructure (leveraging NbS) along the highway (increasing both the *resilience of the infrastructure and resilience through the infrastructure*).

Considerations on how climate resilience is typically incorporated into PPP agreements revealed two options, namely Option 1 (Output focused), where contractors are incentivized to invest in adaptation measures by transferring climate-related risks to them (including narrowing the definition of climate related force majeure) and Option 2 (Input focused), where specific climate resilience requirements are set for the design, maintenance, and operation of the infrastructure in the PPP contract.

For the Abidjan-Lagos Highway it is recommended that an input focused approach (Option 2) should be recommended for several reasons:

- The immature PPP contracting environment in West Africa (will lead to contractors pricing additional risk very high).
- Limited climate related information (in contrast to other more developed markets) and uncertainty on how this will change over time.
- Immature limited market for climate insurance.
- Fiscal constraints of the contracting parties make contractor failure a significant risk (limits step in ability).

An assessment of the respective climate resilience options as inputs for the Abidjan-Lagos Highway were guided by the three main inputs as follows:

- Assessment of the anticipated climate hazards that the project will encounter (climate and risk assessment of the project.
- Proposed adaptation measures to mitigate the identified risks.
- Technical specifications to accommodate climate resilience.

Guidance was further included on where these inputs can in future be incorporated into the ALHP PPP project development and implementation.

Lastly, the existing institutional structure along the highway was evaluated to guide the focus of potential capacity building interventions to fully accommodate and enable implementation of climate resilience in the project development. Several institutional interventions have been proposed in this regard, to assist in creating a positive institutional PPP environment that fosters implementation of increased climate resilience into PPP project delivery.

The key recommendations from this report, including the suggested allocation of responsibilities, are summarised in the Table below.

Table 7: Key recommendations

Aspect	Detailed recommendation	Party responsible
General recommendations	The approach to be taken for the ALHP (simple risk transfer or detailed input requirements to accommodate resilience) will need to be confirmed during the feasibility studies of the three projects.	Transaction advisors
	Procurement documents need to incorporate climate resilience into various sections of returnable documents, ensuring bidders address resilience across all project phases (Project Identification phase, Project Appraisal and Development Phase, Procurement and Award Phase, and the Operations Phase).	Transaction advisors
	Several typical contract amendments align PPP contracts with climate adaptation goals, ensuring resilience and sustainability.	Transaction advisors

	They are recommended in climate resilience frameworks by institutions like the World Bank, OECD, and UNESCAP, which provide detailed guidelines on incorporating climate risk into infrastructure projects.	
	The results of the cost-benefit analysis for the adaptation options in response to increasing flood risk suggest a positive CBA for all Lots, but with the greatest benefit from increased culvert capacity in Lot 3. The results of this analysis also showed the importance of considering the potential for co-benefits, particularly for NbS adaptation options. While the analysis showed that some adaptation options have higher returns on investment (RI) it is recommended that multiple adaptation options should be considered as they all have significant benefits, and these will vary in different locations.	Transaction Advisors
	The PPP Framework must ensure that design and operation of the highway takes into account the potential impacts of climate change, particularly in terms of expected increases in temperature and extreme rainfall that will contribute to increased magnitude and frequency of floods as well as the potential impacts of sea level rise and coastal erosion and the threat from landslides.	ALCoMA and the Task Team
Policy and Regulatory Framework:	Institutions overseeing PPPs must establish and maintain the necessary policy and legal frameworks. These frameworks should facilitate PPP implementation while integrating essential climate resilience mandates, standards, and procedures throughout all phases of the project lifecycle.	The various National Ministries
	Enhance existing PPP frameworks to provide better guidance to line ministries and other relevant stakeholders.	ALCoMA and the Task Team
	Increase stakeholder engagement to ensure a comprehensive understanding of the necessary inputs for implementing and executing PPP projects, including the integration of climate resilience.	ALCoMA and the Task Team
Streamline joint ventures and PPP contractual arrangements.	Include climate adaptation clauses in PPP contracts to allow for project adjustments in response to climate-related impacts, creating flexibility to modify terms, project scope, or funding arrangements as needed.	Transaction advisors
	Foster inter-agency cooperation to align policies and funding streams across sectors (e.g., transport, water, energy) affected by climate change.	ALCoMA and the Task Team
Institutional capacity	Expand the functions and responsibilities of line ministries to provide increased support to ALCoMA.	
	Share responsibilities between line ministries and ALCoMA for the Abidjan-Lagos Highway project to ensure more direct and proactive in-country support for project delivery in each corridor country.	ALCoMA, the Task Team, and the National Ministries
	Enhance institutional capacity within line ministries of the respective corridor countries to provide direct and proactive involvement and contributions to ALCoMA, ensuring optimal in-country project delivery.	National Governments, supported by ALCoMA
	Establish climate resilience indicators and require regular reporting on these metrics to evaluate the performance of PPPs in building climate resilience.	ALCoMA and the Task Team
	Develop clear guidelines for sharing climate risks between public and private partners, ensuring equal risk distribution in the event of climate-induced disruptions.	ALCoMA and the Task Team
Incentives to Promote Climate-Resilience	Provide incentives for PPP projects to encourage stakeholders to integrate climate resilience elements throughout the project lifecycle.	Transaction Advisors

Incorporation into PPPs:	Consider potential incentives such as subsidies or discounts for projects that excel in incorporating climate resilience components.	ALCoMA
Financing:	Increase access to financing for PPP projects that incorporate climate resilience components.	Bi- or Multilateral DFIs
	Create dedicated funds or pooled resources to cover unexpected costs from climate impacts, making it easier to repair or modify infrastructure to be climate resilient.	ALCoMA supported by Bi- or Multilateral DFIs
Capacity Building	Develop institutional skills in PPPs to enhance understanding of PPP frameworks, principles, delivery models, and development processes.	ALCoMA and the Task Team
	Develop institutional skills in climate change to understand its impact on transport infrastructure, how to incorporate climate resilience, and the tools available for integrating climate resilience into PPPs and related transport projects.	ALCoMA supported by Climate related NGOs/DFIs
Climate Data and Information Sharing Platforms:	Create shared databases accessible by ALCoMA and corridor countries to support shared knowledge on climate-related issues, including live climate data, hazard maps, climate vulnerability studies, and climate-vulnerable hotspots in the Abidjan-Lagos Highway.	ALCoMA and the Task Team
	Establish interactive communication channels within the database for sharing and discussing relevant information between ALCoMA, corridor countries, and other stakeholders.	ALCoMA and the Task Team
Stakeholder Engagement:	Engage local communities in the planning and implementation stages of PPP projects to ensure infrastructure is designed with local climate conditions and socioeconomic factors in mind.	National Ministries

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ANNEXURE 1 – INDICATIVE CLIMATE-RELATED HAZARDS TO ROADS

Source: The World Bank (2023)

		Hazard Name	Hazard Description	Impacts on Road Assets	Intensity Measures (IMs)/ Indicators Relevant to Road Assets
SEA LEVEL RISE	CHRONIC HAZARDS	**Inland Inundation**	Coverage of inland due to chronic sea level rise.	Coverage of road assets (e.g., road pavement) located at low altitude, in close proximity to the seaside.	- Change of sea level as a global average - Change of sea level locally - Measurement of potential sea-level anomalies
		Coastal Erosion	Coastal erosion is the process by which local sea-level rise, strong wave action, and coastal flooding wear down or carry away rocks, soils, and/or sands along the coast.	Gradual deterioration of coastal road assets, such as bridge foundations, earthworks, etc. Damage could lead to malfunction or even to subsequent collapse.	- Measurement of local sea-level rise - Soil type/stiffness and strength - Wave energy, etc.
	ACUTE HAZARDS	**Tidal Waves/ Storm Surge**	The temporary increase, at a particular locality, in the height of the sea due to tidal conditions affecting the coastal environment.	Temporary coverage of road assets (e.g., road pavement) located at low altitude, in close proximity to the seaside. Damage of coastal road infrastructure (bridges, road furniture, etc.). Potential accidents, injuries/deaths.	- Measurement of potential sea-level anomalies - Duration of tidal sea-level rise, etc.
		Landslides/Rockfalls (as a result of coastal erosion)	A mass of material that has moved downhill because of gravity, often assisted by water when the material is saturated. Sea-level rise may cause landslides due to coastal erosion.	Displacement/instability or even collapse of road assets (e.g., bridges, retaining structures, etc.) located within an area that is prone to landslides.	- Water level and wave energy - Soil type - Slope angle, etc.
PRECIPITATION	ACUTE HAZARDS	**River Flood**	The overflowing of the normal confines of a stream or other body of water, or the accumulation of water over areas that are not normally submerged.	- Operational disruption due to coverage of the road pavement with water. - Scouring of bridge foundations and subsequent failure.	- Measurement of flood height - Peak water velocity - Maximum 24-hour flood volume - Total flood volume per month/year - Frequency of flood events per month/year, etc.
		Urban Flooding	Accumulation of water in urban areas due to extreme precipitation and failure of the drainage system.	- Operational disruption due to coverage of the road pavement with water - Damage of the road furniture - Potential accidents	- Measurement of flood height - Peak water velocity - Maximum 24-hour flood volume - Total flood volume per month/year - Frequency of flood events per month/year, etc.
		Coastal Flood/Storm Surge	The temporary increase, at a particular locality, in the height of the sea due to extreme meteorological conditions (precipitation, low atmospheric pressure and/or strong winds).	Periodic increase of sea level may affect low-altitude road assets; water could cover the pavement and cause operational disruptions and/or car accidents.	- Measurement of potential sea-level anomalies - Duration of sea-level rise, etc.
		Landslides/Debris Flow	A mass of material that has moved downhill because of gravity, often assisted by water when the material is saturated.	Displacement/instability or even collapse of road assets (e.g., bridges, retaining structures, etc.) located within an area that is prone to landslides.	- Soil type - Soil permeability - Slope angle - Groundwater level - Pore - water pressure, etc.
		Snowfall/Hail	A form of precipitation consisting of individual ice crystals (snow) or solid ice (hail).	Operational disruption and damage of road furniture. Accidents may occur due to ice/snow on the pavement.	- Amount of snow per month/year and seasonal change of precipitation patterns - Maximum hail size - Duration of the event - Frequency of hail events or extreme snowfall per year - Speed of ice, etc.
TEMPERATURE	CHRONIC HAZARDS	**Excessive Heat**	Temperature that is rare (unusually high) in a particular place and at a particular time of year (i.e., higher than the 10th or 90th percentile of a probability density function estimated from observations).	- Asphalt rutting, flushing, and bleeding of bituminous surfaces and/or cracking. - Loss of bitumen stiffness and subsequent permanent deformations due to traffic loading. - Decrease of productivity during construction, operation and maintenance due to unhealthy working conditions.	- Maximum temperature per month/year - Number of summer days (e.g., days with maximum temperature >25°C) per year, etc.
		Excessive Cold	Temperature that is rare (unusually low) in a particular place and at a particular time of year (i.e., lower than the 10th or 90th percentile of a probability density function estimated from observations).	- Asphalt rutting, flushing and bleeding of bituminous surfaces and/or cracking. - Loss of bitumen stiffness and subsequent permanent deformations due to traffic loading. - Decrease of productivity during construction, operation and maintenance due to unhealthy working conditions.	- Minimum temperature per month/year - Number of cold days (e.g., days with maximum temperature < 20°C), etc.
	ACUTE HAZARDS	**Drought**	A period of abnormally dry weather lasting long enough to cause a serious hydrological imbalance. Drought is a relative term and must refer to the particular precipitation-related activity that is under discussion.	- Increased mortality of plants along road alignments (planted slopes, embankments, etc.). This may subsequently increase risk of flooding, landslides, etc. - In combination with temperature rise, drought may cause asphalt deterioration.	- Standardized precipitation index (SPI) - Soil moisture, - Groundwater and reservoir storage - Length of the longest period of consecutive days without rain, etc.
		Ice Melt/Permafrost Thaw	Progressive loss of sea ice, glacier, or ground (soil or rock, including ice and organic material) that remains at or below 0°C for at least two consecutive years.	Displacement/instability or even collapse of road assets located within a permafrost area prone to melting and ice displacement.	- Sub-surface temperatures - Near permafrost surface air temperature - Melting ratio - Ice displacement per year, etc.
		Wildfires	Uncontrolled fires that burn in wildland vegetation, often in rural areas.	- Partial operational disruption of road network. - Destruction of plantation along road alignments.	- Total number of fires per month/year (frequency) - Total land area burned (magnitude) - Age of forest and plantation - Humidity of the area, etc.
WIND	ACUTE HAZARDS	**Tornadoes/Twisters/ Hurricanes/Tropical Cyclones**	A violently rotating column of air touching the ground, usually attached to the base of a thunderstorm. In the case of tropical cyclones, the term refers to a strong, cyclonic-scale disturbance that originates over tropical oceans.	Tree falls, signpost failures, difficulty in driving, and consequent operational disruptions and accidents.	- Maximum wind speeds - Frequency of tornadoes per month/year - Maximum wind gust speeds per month/year - Number of consecutive days with extreme wind (i.e., speed > 70 mph) per month/year, etc.
		Dust Storms	The result of terminal winds raising large quantities of dust into the air and reducing visibility at eye level (1.8 meters) to less than 1,000 meters.	Coverage of network assets with dust and consequent operational disruption and/or car accidents.	- Dust particle concentrations, - Dust storm average duration, etc.

ANNEXURE 2 – STANDARD KPIS IMPACTED BY CLIMATE CHANGE

Source: Arup 2018

Physical KPIs	Unit of Measurement		
Flooding	Depth	**Debris Damage**	Quantity
Erosion	Volume	**Wall/tunnel damage (increased accidents)**	Length
Scour	Area	**Mechanical failure (increased pumping)**	Quantity
Pavement cracking/potholes	Area	**Salt damage (from snow treatment)**	Area
Asphalt wear	Roughness	**Snow plow damage**	Area
Drainage network damage	Blockage	**Electrical failure**	Quantity
Metal corrosion	Area	**Camera failures**	Quantity
Landscape damage	Area	**IT failures**	Quantity
Embankment failure	Length	**Street Light deterioration**	Quantity
Fire damage	Area	**Paint peeling**	Area
Railing failure	Length	**Paint melting**	Area
Operational KPIs	**Unit of Measurement**		
Accidents	Quantity	**Accessibility**	
Level of service	Rating	**Sun exposure/ Heat exhaustion**	People
Travel time	Minutes	**Capacity (change due usage type)**	Vehicles
Availability	Days	**Demand (change due to lifestyle changes)**	Vehicles
Delay Volume	Hours	**Snow removal time**	Minutes

ANNEXURE 3 – EXAMPLE FORCE MAJEURE CLAUSES THAT INCORPORATE CLIMATE CHANGE

EXAMPLE 1: FORCE MAJEURE CLAUSE THAT EXPLICITLY INCORPORATES CLIMATE CHANGE RISKS

Below we include a Force Majeure clause that specifically incorporates climate change risks. This clause not only addresses the traditional concept of Force Majeure but also specifically includes risks related to climate change, such as extreme weather events and government actions related to environmental regulation. It also provides a mechanism for the parties to revisit the clause as climate risks evolve.

Basic Force Majeure Clause

1. Definition of Force Majeure
   For the purposes of this Agreement, "Force Majeure" shall mean any event or circumstance, whether foreseeable or unforeseeable, that is beyond the reasonable control of the affected party and that prevents or delays the performance of its obligations under this Agreement, including but not limited to:
   - Acts of God, natural disasters (such as earthquakes, hurricanes, floods, wildfires), and extreme weather conditions directly or indirectly attributable to climate change, such as rising sea levels, prolonged droughts, or severe storms.
   - War, terrorism, civil unrest, or acts of public enemies.
   - Government actions, including new regulations or changes in laws related to climate change, environmental protection, or public health emergencies.
   - Pandemics, epidemics, or other public health emergencies.
   - Interruptions or failures of infrastructure or utilities, including power outages, water supply interruptions, or transportation disruptions, particularly where such interruptions are exacerbated by climate change-related events.
2. Notification and Mitigation
   The affected party shall promptly notify the other party in writing upon the occurrence of a Force Majeure event, providing reasonable details of the event and its anticipated impact on the performance of obligations under this Agreement. The affected party shall use all reasonable efforts to mitigate the impact of the Force Majeure event and to resume performance as soon as practicable.
3. Suspension of Obligations
   If a Force Majeure event occurs, the obligations of the affected party shall be suspended to the extent that they are prevented or delayed by the Force Majeure event. The affected party shall not be liable for any failure or delay in performing its obligations under this Agreement to the extent that such failure or delay is caused by a Force Majeure event.
4. Termination for Prolonged Force Majeure
   If a Force Majeure event continues for a period of [specify duration, e.g., 90 days] or more, either party may terminate this Agreement by giving written notice to the other party. Upon such termination, neither party shall have any further obligations or liabilities under this Agreement, except for those that have accrued prior to the effective date of termination.
5. Climate Change-Related Adjustments
   The parties acknowledge the potential for increased frequency and severity of Force Majeure events due to climate change and agree to periodically review and, if necessary, amend this clause to address such risks.

EXAMPLE 2: FORCE MAJEURE CLAUSE THAT TRANSFERS RISK TO PRIVATE PARTY

Below is a revised version of the Force Majeure clause that transfers more of the climate-related risk to the other party. This version narrows the scope of what constitutes a Force Majeure event and imposes additional obligations on the party seeking to claim Force Majeure. In this version, the affected party (the one claiming Force Majeure) has a higher burden to prove that the event was truly unforeseeable and that they took all reasonable measures to prevent or mitigate its effects. Additionally, the unaffected party has more rights to demand alternative performance or compensation, and the scope of what qualifies as Force Majeure is narrowed, particularly concerning climate-related risks.

Amended Force Majeure Clause

1. Definition of Force Majeure
   For the purposes of this Agreement, "Force Majeure" shall mean any unforeseen and extraordinary event or circumstance beyond the reasonable control of the affected party that prevents or delays the performance of its obligations under this Agreement, including:
   - Acts of God and natural disasters (such as earthquakes, hurricanes, and floods) that are not reasonably foreseeable or preventable through commercially reasonable efforts, excluding weather-related events that can be anticipated due to known patterns or climate change projections.
   - War, terrorism, civil unrest, or acts of public enemies.
   - Government actions directly resulting in the inability to perform obligations under this Agreement, excluding regulatory changes related to climate change that were foreseeable at the time of entering into this Agreement.
   - Pandemics, epidemics, or other public health emergencies not attributable to the affected party's actions or inactions.

Exclusions:
The following events or circumstances shall not constitute Force Majeure under this Agreement:

- Extreme weather conditions, natural disasters, or other events attributable to climate change that are foreseeable or could have been mitigated by the affected party through commercially reasonable planning or adaptive measures.
- Interruptions or failures of infrastructure or utilities, including power outages, water supply interruptions, or transportation disruptions, where such interruptions are exacerbated by climate change-related events and could have been reasonably anticipated and mitigated by the affected party.

2. Notification and Enhanced Mitigation
   The affected party shall provide written notice to the other party within [specify duration, e.g., 48 hours] of the occurrence of a Force Majeure event, including a detailed explanation of the event and the specific obligations impacted. The affected party shall also demonstrate that it has taken all commercially reasonable steps, including climate risk assessments and adaptive measures, to prevent or mitigate the impact of the Force Majeure event.
3. Obligations to Perform
   The affected party shall use all commercially reasonable efforts to continue performing its obligations under this Agreement despite the occurrence of a Force Majeure event. The suspension of obligations shall only apply to those specific obligations that the affected party is unable to perform despite such efforts. The unaffected party shall have the right to demand alternative performance or compensation for any delays or failures attributable to the Force Majeure event, particularly if such delays or failures were foreseeable or could have been mitigated.
4. Termination for Prolonged Force Majeure
   If a Force Majeure event continues for a period of [specify duration, e.g., 60 days] or more, the unaffected party may terminate this Agreement by giving written notice to the affected party. Upon such termination, the unaffected party shall be entitled to recover any direct costs or

losses incurred as a result of the Force Majeure event, to the extent that the event was foreseeable or could have been mitigated.

5. Climate Change-Related Risk Allocation
   The parties acknowledge the increasing frequency and severity of climate change-related events and agree that the affected party assumes the risk of such events to the extent that they are foreseeable or could be mitigated through commercially reasonable measures. The unaffected party shall not bear any financial or operational burden resulting from the affected party's failure to adequately plan for or respond to climate change-related risks.

ANNEXURE 4 – OVERVIEW OF NATIONAL INSTITUTIONAL FRAMEWORKS SUPPORTING PPPS ALONG THE HIGHWAY

BENIN

Agency that Oversees PPPs
Support Cell in Public Private Partnership: Section 5(1)(2) of Decree No 2014-349 of 2 June 2014 concerning guidance note on PPP provides for a support cell in Public Private Partnership (Cellule d'appui au Partenariat Public-Privé: CAPPP) that is an organization, expert in the implementation structure of the institutional framework and management of PPP. It is attached to the Presidency of the Republic. Its effectiveness relies on a multidisciplinary organization (economists, financial, legal, administrative, etc.) The Council of Ministers is the supreme body of decision making in the implementation process of the PPP projects
PPP Agency Responsibilities
The CAPPP is a center of knowledge and expertise for the implementation of PPP projects. In this respect, it: Advises the government on all matters relating to PPP. Provides a catalogue of projects eligible for PPP. Provides assistance in achieving the socio-economic studies for projects outside the catalogue and feasibility studies. Issues an opinion on socio-economic studies and externalities and feasibility studies. Assists in the contract award process, and - Supports the carrying organisms in the management of contract enforcement.
Other Parties Involved
Key agencies include the Public-Private Partnership Support Unit, a line ministry level body that reports to the Council of Ministers; the National Procurement Control Department, overseeing the call for tenders; and the Public Market Regulatory Authority, which mediates disputes between private partners and contracting authorities. The legal entities that may enter into public-private partnerships as a contracting authority are: The State, local authorities, public establishments, companies with majority public financial participation, state companies, public law organizations as defined in Directive No 04/2005 / CM / UEMOA, the associations formed by one or more legal entities of public law. The Council of Ministers is the supreme body of decision making in the implementation process of the PPP projects: It approves key stages of the PPP process; and it authorizes the signing of contracts. But more specifically the Organic Law 2013-14 of September 27, 2013 concerning finance laws provides that: for public-private partnership contracts, the State entrusts a third-party financing, construction, maintenance or operation of public investment operations, from the year when the contracts are concluded. PPPs are included in the investment expenditure covered by the Finance Act. This ensures approval and the parliamentary control and should ensure the quality and the competence of the authorizing Minister of Finance (or his delegate in these functions- Article 69, 70, 71 OBL) for prior approval. The Support Unit for Public-Private Partnerships (La Cellule d'Appui aux Partenariats Public-Privé) attached to the Presidency of the Republic and (2) The Public Contracts Control National Directorate acting under the supervision of the Minister in charge of Finance. Pursuant to Article 11 of Law No.2009-02, a National Directorate of Public Contracts Control (DNCMP) was established, under the supervision of the Minister in charge of finance. It is the central body of procurement control.
National Policy that Guides PPP Implementation
No policy appears to be in place.
National Law that Guides PPP Implementation

Rules for PPP implementation, including regulations pertaining to all project phases, are codified in the Private-Public Partnership Law of 11 October 2016. As of 2015, Benin did not have a PPP law in place, but a PPP law is currently under preparation. The general principles of contract law as well as Law No. 2009 -02 dated August 7, 2009 (hereinafter the PP Law) regulating public procurement and delegation of public services in the Republic of Benin apply to PPPs in Benin. Additionally, Decree No 2014-349 of 2 June 2014 concerning guidance note on PPP completes the existing regulation for public service delegations, as indicated in Section 1.2. Organic Law 2013-14 of September 27, 2013 concerning finance laws provides that: for public-private partnership contracts, the State entrusts a third-party financing, construction, maintenance or operation of public investment operations, from the year when the contracts are concluded

Standard Documents / Agreements that could be used for PPPs

The Government of Benin passed a new legal framework on public-private-partnership (PPP) in 2016.Rules for PPP implementation are codified in the Private-Public Partnership Law of 11 October 2016. Section 6(2)(1) of Decree No 2014-349 of June 2, 2014, concerning the guidance note on PPP, provides that PPP Projects should be submitted to a socio-economic study to determine the expected costs and benefits to the public person.

Sections 6(2)(3) and 6(2)(4) of Decree No 2014-349 of June 2, 2014 concerning the guidance note on PPP provide that, in parallel with the feasibility study, the projects to be implemented in the partnership agreement, are subject to a fiscal sustainability study to evaluate all the consequences of operation on public finances and credit availability.

Challenges

There are no publicly available manuals outside of the 2016 PPP law and the PAG.

CÔTE D'IVOIRE

Agency that Oversees PPPs
Responsibility for PPPs is shared between three bodies, all of which report to the Presidency, but with staff drawn from different ministries and agencies. The Comité National de PiLotage des PPP (CNP-PPP), or national steering committee, is responsible for strategic oversight of the sector and approving new PPP projects. The Secrétariat Exécutif des PPP provides administrative and technical support, outreach and training. The Cellule d'Appui des PPP, or support unit, assists with project preparation and monitors implementation. The PPP regulatory framework in Cote d'Ivoire consists of the following: Decree No. 2012-1151 of December 19, 2012, relating to public-private partnerships; Decree No. 2012-1152 of September 19, 2012, relating to attribution, organization and functioning of the institutional framework management of public-private partnerships institutional frame such as modified by Decree No. 2014-246 of May 08, 2014.
PPP Agency Responsibilities
The Comité National de PiLotage des PPP (CNP-PPP) is responsible for strategic oversight of the sector and approving new PPP projects. The Secrétariat Exécutif des PPP provides administrative and technical support, outreach and training. The Cellule d'Appui des PPP, or support unit, assists with project preparation and monitors implementation.
Other Parties Involved
PPP procuring authorities are: National Authority of Procurement contract regulation (Autorité Nationale de Régulations des Marchés Publics): www.anrmp.ci National Steering Committee for public-private partnerships (Comité National de PiLotage des PPP) : http://www.ppp.gouv.ci/faq.html Secrétariat Exécutif des PPP Cellule d'Appui des PPP. Article 15 paragraph 2 of Decree No. 2012-1151 of December 19th, 2012, relating to direct agreement procedure provides that the resort to the procurement process requires the approval of the Ministry of Finance.
National Policy that Guides PPP Implementation
Unclear
National Law that Guides PPP Implementation
Public procurement is governed by two laws: Decree 2009-259 (amended by Decree 2014-306 and Decree 2015-525) provides the framework, while Decree 2009-260 (amended by Decree 2013-308) establishes a National Authority for the Regulation of Public Procurement (Autorité Nationale de Régulations des Marchés Publics, ANRMP). A decree adopted in June 2018 mandated ANRMP as an Independent Administrative Authority, responsible for resolving disputes and conducting independent audits of the award and implementation of PPP contracts. PPP legislation is expected to change in the near future, with the Council of Ministers having reportedly adopted two new decrees in March 2018; although these documents have yet to be made public or enter into effect.
Challenges
The primary challenge facing the government and the PPP units is that often contracts are awarded on the basis of direct negotiation rather than competitive bidding. Investors have concerns about transparency in the award and implementation of PPP contracts. There is a lack of clarity concerning the proposed role of the ANRMP (National Authority for the Regulation of Public Procurement. Investors have concerns about transparency in the award and implementation of PPP contracts. It is not currently a requirement to publish bidding documents or renegotiated contracts. The CNP-PPP has yet to publish a procedural guide for the PPP sector, despite this existing in draft form. There is a lack of clarity concerning the proposed role of the ANRMP. Budgetary and fiscal risks, such as contingent liabilities, remain a challenge
Additional
6th Africa Public Private Partnership Conference and Showcase (APPP 2014) | 19-21 November 2014 | Abidjan, Cote D'ivoire. This diagnostic study gives an overview of public-private partnership (PPPs) in infrastructure projects in Côte d'Ivoire—and their types, difficulties, opportunities, and risk mitigation. Providing the PPP agencies greater autonomy and resources would enable them to better identify eligible projects and assess their financial viability. An independent PPP funding facility is gradually taking shape, partly financed from the national budget, and partly from success fees; however, this funding facility would benefit from formalisation and additional capital.

GHANA

Agency that Oversees PPPs
Ministry of Finance: The Ministry of Finance (MoF) in 2010 established the Public Investment and Assets Division (PIAD) as the Ghana PPP Advisory team to take a lead role over the PPP Programme in Ghana. The Division comprises three units, two of which play particularly key roles in the PPP agenda, namely the Public Investment Programme (PIP) Unit and the Public Private Partnership (PPP) Office.
PPP Agency Responsibilities
Public Investment Programme (PIP) Unit: Gatekeeping and upstream investment appraisal responsibilities. **Public Private Partnership (PPP) Office:** Provision of technical expertise to support the relevant line Ministries, Departments and Agencies (MDAs) and Metropolitan, Municipal and District Assemblies in the development and management of prospective PPP transactions that satisfy Government of Ghana public investment priorities.
Other Parties Involved
MoF Public Investment Division. MoF Debt Management Division. MoF Budget Division. MoF Legal Division. National Development Planning Commission (NDPC). Government Contracting Authorities (Ministries, Departments and Agencies and Metropolitans, Municipalities and District Assemblies). Public Procurement Authority. Ministry of Trade and Industry. Cabinet. Parliament. PPP Approval Committee. Attorney General's Department. Regulatory Authorities
National Policy that Guides PPP Implementation
National Policy on Public-Private Partnerships (2011): The Ministry of Finance developed the PPP Policy to provide a clear and consistent process for all aspects of PPP project development and implementation, from project identification, appraisal, selection, to procurement, operation and maintenance and performance monitoring and evaluation. **Ghana PPP Bill (2013):** Currently awaiting passage into an Act.
National Law that Guides PPP Implementation
Public Private Partnership Act, 2020 (Act 1039 of 2020): The Act provides for the development, implementation and regulation of PPP arrangements between contracting authorities and private parties for the provision of infrastructure and services, to establish institutional arrangements for the regulation of PPPs and to provide for related matters.
Standard Documents / Agreements that could be used for PPPs
Appropriation Act, 2023 (Act 1113 of 2023): The Act provide for withdrawal of sums of money necessary to meet Government expenditure for the 2024 financial year from the Consolidated Fund and other public funds and related matters. **Public Financial Management (Public Investment Management) Regulations, 2020:** The Regulations prescribe the method for the preparation, evaluation and execution of investment projects.

Challenges
The inability to pass the 2013 PPP Bill continues to constrain public-private finance flows. Without mandated, comprehensive guidelines and criteria included in the PPP Bill, the PPP framework remains weak, requiring greater stakeholder engagement.

NIGERIA

Agency that Oversees PPPs
Infrastructure Concession Regulatory Commission (ICRC): The ICRC was established in 2008 as the agency charged with supporting the federal government's drive towards the PPP model to fund much-needed infrastructural projects, including those that are greenfield. The ICRC will also superintend and regulate Public-Private Partnership (PPP) endeavors of the Federal Government of Nigeria aimed at addressing Nigeria's physical infrastructure deficit which hampers economic development. The ICRCA permits any federal government ministry, agency, corporation or body involved in infrastructure development and financing to enter into contracts with private sector proponents for the development, financing and operation of infrastructure.
PPP Agency Responsibilities
Board of ICRC: The mandate is to: Develop and issue PPP guidelines on policies, processes and procedures and to act as national centre of PPP expertise. Work closely with relevant MDAs to identify potential PPP projects. Act as interface with the private sector to promote communication on national policies and programmes. Monitor effectiveness of Government's policies and processes. Provide independent advice to the Federal Executive Council (FEC) on development of national PPP policy. Provide opinion to FEC on whether projects submitted for FEC approval meet requirements of the regulations. Ensure consistency, best practice and a coordinated approach to the private sector supplier market. Maintain PPP project database. Retain custody of all PPP agreements as required by the legislation. Provide oversight and strategic direction to the PPP Resource Centre and the Contract Monitoring Unit through its internal governance structures. **ICRC Contract Monitoring Unit:** Monitor compliance with contractual terms and conditions by both parties. **ICRC PPP Resource Centre:** Provision of Technical Assistance to MDAs in development and procurement of PPP projects. Co-fund project preparation and procurement costs, specifically costs of external project advisers.
Other Parties Involved
National Planning Commission (NPC): Developing a 15-year investment strategy (e.g., National Development Plan) for all infrastructure services. MDAs to identify their long-term infrastructure plans in indicate funding will be through PPP or from MDA budgets. MDAs to prepare long-term plans for infrastructure investment and maintenance and identify where PPP is likely to offer better value for money. **Federal Ministry of Finance:** Public financial management of PPP projects. Evaluating and managing fiscal risks that may result from terms of agreements. Ensure that forecast costs for Government are affordable over contract life and within Medium Term Expenditure Framework (MTEF). **Debt Management Office:** Confirm that any contingent liabilities are manageable within Government's economic and fiscal forecasts. **Accountant General of the Federation:** Government will put in place measures through the Office of Accountant General of the Federation to ensure that funding for payment obligations incurred through a Federal PPP contract is safeguarded to ensure prompt payment, subject to appropriate authorisation. **Bureau of Public Procurement (BPP):** Ensure due process in the procurement of public works and services. ICRC PPP Resource Centre will work with BPP to develop appropriate procurement processes for PPP projects. **Bureau of Public Enterprises (BPE):** Skills and capacity developed in BPE as well as lessons learned through various Concessions to be made available in implementing PPP and other concession projects under new PPP Policy. **BPE Infrastructure and Public Private Partnership Department:**

Other Parties Involved
Unit: (1) Social Infrastructure Unit, (2) Physical Infrastructure Unit, (3) Public Asset Optimisation Unit. Developing framework for PPP projects in compliance with BPE's Procedure Manual, National PPP Policy (N4P) and in line with international best practice. Assessing current status and performance of key infrastructure in the relevant economic sectors, in collaboration with the MDAs and other relevant stakeholders to identify, prioritise, and select those that can be undertaken through PPP. Providing technical assistance to MDAs or Project sponsors in conducting option analysis, affordability test, negotiating/re-negotiating of all PPP projects using appropriate financial models to ensure viability and Value for Money (VfM). Analysing all PPP projects with a view to determining the participation of each party in the procurement arrangement. Driving the transaction process for all the PPP projects in the country in accordance with the BPE's procedure and ICRC guidelines up to the emergence of a preferred concessionaire or private sector party. Evaluating PPP projects performance in collaboration with the concerned MDAs and ICRC.
National Policy that Guides PPP Implementation
National Policy on PPPs, 2009: The Policy, as developed by the ICRC and approved by the Federal Executive Council, provide clear and consistent process and procedure guides for all aspects of PPP projects development and implementation from project identification, evaluation, selection, to procurement, operation, maintenance and performance monitoring. This policy sets forth the ways private investment could be leveraged in tackling poor infrastructure stocks, while boosting delivery of services to the public in a sustainable way. This is pursuant to sections 33 and 34 of the Infrastructure Concession Regulatory Commission Act (ICRCA). The key policy objectives are economic-, social-, environmental- and value-for-money related.
National Law that Guides PPP Implementation
ICRC Act of 2005: Allows all Ministries, Departments and Agencies (MDAs) of the Federal Government of Nigeria (FGN) to effectively enter into partnership with the private sector in financing, construction, operation and maintenance of infrastructure projects in line with the ICRC Act of 2005. The ICRCA Act was enacted in 2005. Note: There is no statutory definition for PPPs in Nigeria. However, the explanatory memorandum to the ICRCA states that the act provides for the participation of the private sector in financing the construction, development, operation, or maintenance of infrastructure or development projects of the federal government through concession or contractual arrangements. **Privatisation and Commercialisation Act, 1999:** The Act provides for the Privatisation and Commercialisation of Certain Public Enterprises and to Establish the National Council on Privatisation and the Bureau of Public Enterprises.
Standard Documents / Agreements that could be used for PPPs
Privatisation and Commercialisation Act, 1999: The Act provides for the Privatization and Commercialization of Certain Public Enterprises and to Establish the National Council on Privatization and the Bureau of Public Enterprises. **Fiscal Responsibility Act, 2007:** The Act provides the framework for prudent management of resources, accountability, and transparency in Nigeria's fiscal operations. **Public Procurement Act, 2007:** An Act to establish the National Council on Public Procurement and the Bureau of Public Procurement as the regulatory authorities responsible for the monitoring and oversight of public procurement, harmonizing the existing Government policies and practices by regulating, setting standards and developing the legal framework and professional capacity for public procurement in Nigeria. **Public Enterprises (Privatisation and Commercialisation) Act of 1999:** The Act establishes the National Council on Privatisation and the Bureau of Public Enterprises (BPE) as the supervisory and implementing agencies respectively for privatisation and commercialisation transactions.
Challenges
Problems or the challenges of Public-Private-Partnership include multiplicity of functions by various bodies, definitional issues, joint venture agreements, conflicts and contractual review conflicts. Over recent years Nigeria experienced poor execution of PPP projects as a result of policy, legal, institutional and regulatory

bottlenecks and lack of strategic direction for infrastructure. A Policy Brief dated August 2017 recommends the review of the National Integrated Infrastructure Master Plan (NIIMP), enactment of PPP legislation and implementation support to de-risk execution of PPPs in Nigeria.

TOGO

Agency that Oversees PPPs

Ministry of Economy & Finance:

The Ministry of Economy and Finance is responsible for the general direction of the government's economic and financial policy and the management of state assets. The Ministry furthermore ensures the financial supervision of public or state-owned companies and establishments and, where appropriate, contributes to their transfer to the private sector, within the legislative and regulatory frameworks of the privatization process.

Article 20 of the PPP Law provides that the Minister of Finance is asked for their opinion during the prior assessment phase. The Ministry of Finance or Central Budgetary Authority approved the PPP project before launching the procurement process. In terms of budgeting for PPP projects (e.g., including the estimated total cost of the PPP project over the life of the project in the budget cycle), Article 21 of the PPP Law specifically address budgeting stating that the PPP project should listed in the State's budget and budgetary projections.

PPP Unit:

Article 11 of the PPP Law states that a PPP Unit shall be created by decree. Subsequently, Togo has established a PPP unit.

Article 2 of the PPP Decree states that "the Unit's mission is to advise and assist the contracting authorities in the preparation and execution of public-private partnership contracts. It contributes to the development of public-private partnership contracts". The Unit will "advise and provide expertise to contractors in the preparation and execution of public-private partnership deals." The PPP Unit decree specifies its missions, organization and responsibilities as stated in Article 1 which also provides that the PPP Unit is attached to the Presidency of the Republic.

PPP Agency Responsibilities

Ministry of Finance:

The Togo Ministry of Finance is responsible for developing and managing the Togo PPP Program by focusing on capacity building and strengthening the enabling environment through: (i) a PPP policy/legal/regulatory review; (ii) a feasibility study of the PPP Unit; (iii) a diagnostic of the PPP pipeline; and (iv) PPP capacity and institutional building.

PPP Unit:

Article 3 to 7 of the PPP Unit Decree specify all the responsibilities of the PPP Unit:

Draw up a PPP Contracts Development National Strategy in the medium and long term.
Initiate and submit to the orientation and decision committee reforms, or of the legislative and regulatory texts or administrative procedures relating to PPP contracts.
Participate in elaboration of standards and technical specifications and the applicable quality management system for PPPs.
Promote development of appropriate financing tools and structures for realizing projects in PPPs.
Participate in development and implementation of training and capacity building strategies for PPPs.
Contribute to identifying and controlling legal, financial and budgetary risks for involved contracting authorities.
Promote the financing of PPPs, through expertise in financing techniques, financial engineering, and application of financial instruments.

Article 20 of the PPP Law provides that the PPP Unit shall give its motivated opinion before launching the procurement procedure and more particularly at the preliminary evaluation stage. It may also request the opinion of other sectorial entities if needed.

Other Parties Involved

National Directorate for Public Procurement:

Article 39 of the PPP Law of 2021 provides that, following contract negotiation, the contracting authority submits the draft contract to the National Directorate for Public Procurement of the National Directorate for Public Procurement Control.

Public Procurement Regulatory Authority:

In July 2022, a new decree was adopted to allow the former Public Procurement Regulatory Authority (ARMP) to also regulate Public-Private Partnerships (PPP). The newly renamed ARCOP will regulate PPP contracts entered into by the state or public entities, in addition to public contracts.

National Policy that Guides PPP Implementation

PPP Policy is still in the very early stages in Togo and lacks sufficient structuring to support projects that are essential to achieving the priority targets of the Sustainable Development Goals (SDGs).

National Law that Guides PPP Implementation
Law No. 2021-034 of December 31, 2021: A new draft PPP law was adopted in September 2021 by the Council of Ministers and approved by Parliament, and update the 2014 framework created on partnership contracts, which was never fully implemented. The PPP Law repeals Title I and Title II of the PPP Law of 2014 pertaining respectively to Public-Private-Partnerships contracts and Concessions, as well as any previous provision contrary to this law. Article 4 of the PPP Law provides that the provisions are applicable to "public-private partnership with public payment and payment by the users or the users according to the terms of remuneration of the holder and the transferred risks. **Decree No. 2022-065/PR of May 11, 2022:** The Decree states the modalities for the implementation of procedures for awarding and executing PPP contracts and specifies the rules applicable to the preparation, procurement, monitoring, execution, and regulation of PPP contracts. **Decree No. 2022-066/PR:** Provides for the creation of a PPP Unit on the missions, attributions, organization and functioning of the PPP Unit. The objective of the PPP Unit is to advise and assist the procuring entity in the preparation and execution of PPP contracts.
Standard Documents / Agreements that could be used for PPPs
(1) Current Procedures Manual for PPP Public Investment Project Selection and Prioritization. (2) Law No. 2021-033 of December 31, 2021, on public procurement. (3) Decree 2022-080/PR of July 6, 2022, on the Public Procurement Code. (4) Decree No. 2022-070/PR of May 30, 2022, on the attribution, organization and functioning of the National Directorate for the Control of Public Procurement.
Challenges
Togo has been successful in managing projects that have attracted private investors and has developed the capacity to conduct transactions with private actors in several sectors. However, the current PPP environment suffers from a lack of transparency, and PPP regulations and institutional framework in Togo are currently weak. A major hurdle lies ahead for ECOWAS implementation of its PPP framework, even with the withdrawal of three of its member states (Burkina Faso, Mali, and Niger), as stated in the introduction. It remains to be seen how their withdrawal will affect the region's masterplan, PPP financing, implementation, and capacity building and what it will portend for collaborations, partnerships, and sustainable development in West Africa.
Additional
Support Project for Investment Promotion and Development of Private-Public Partnerships (PAPIDPPP): An institutional support and capacity building operation aimed at supporting the Government's efforts to build a diversified and competitive economy, supported by a dynamic private sector.

ECOWAS SUPPORT

PPP ECOWAS
ECOWAS take responsibility for its member countries through the following solutions: (1) ECOWAS Regional Infrastructure Master Plan 2045 - Aimed at resolving the infrastructure deficit in the community (PPIAF 2022b) and facilitating integrated infrastructure delivery. ECOWAS member states development plans are supported by the World Bank Public Private Infrastructure Advisory Facility (PPIAF). This partnership provides effective diagnostics to improve efficiency, build capacity, identify PPP possibilities, and revamp policy and legal frameworks for PPPs, resulting in better access to more financing, proper implementation, monitoring, and sustainability of infrastructural projects. The ECOWAS PPP framework has been able to allow its member states to leverage the advantages that the private sector has to foster sustainable development. The PPP effort must be sustained and enhanced to meet the 2045 infrastructure development targets ECOWAS has set for itself in its master plan. (2) Ecowas PPP Strategy for Infrastructural Development - ECOWAS has employed a National Multilateral PPP Strategy to use partnerships to resolve infrastructure challenges faced by member nations, through its Infrastructure Master Plan. To encourage increased public sector participation ECOWAS, with support from PPIAF, has established a regional framework for PPPs that allow its member states to leverage the advantages that the private sector has to foster sustainable development. As part of the regional framework to advance integration, several strategies have been sought out by ECOWAS and its member states to resolve infrastructural deficits hampering development. The focus is the private sector as a resource base for financing infrastructure development in the region (PPIAF 2023a). PPPs are vital to reducing the infrastructure financing gap that has hampered development in the ECOWAS community, hence the need for collaborative partnerships between the private sector and governments of member states (African Development Bank Group 2023). PPPs should therefore be utilized as a viable means of resolving the infrastructure deficit and creating a solid foundation for sustained development.

GLOBAL
CENTER ON
ADAPTATION

Antoine Platekade 1006
3072 ME Rotterdam
The Netherlands
+31(0)88-088-6800
www.GCA.org