BPLN0039 Dissertation in Planning

by Edward John Fulton Aitken

Submission date: 01-Sep-2019 07:39AM (UTC+0100)

Submission ID: 110409475

File name: 59711_Edward_John_Fulton_Aitken_BPLN0039_Dissertation_in_Planning_1064835_2083616538.pdf (3.5M)

Word count: 21120

Character count: 125959

UNIVERSITY COLLEGE LONDON

FACULTY OF THE BUILT ENVIRONMENT

BARTLETT SCHOOL OF PLANNING

To what extent might the National Infrastructure Commission support sustainable economic growth, improve competitiveness and improve quality of life? A case study on *Transport for a World City*.

Edward Aitken BEnv

Being a dissertation submitted to the faculty of The Built Environment as part of the requirements for the award of the MSc Infrastructure Planning, Appraisal and Development at University College London: I declare that this dissertation is entirely my own work and that ideas, data and images, as well as direct quotations, drawn from elsewhere are identified and referenced.

Signature: 

Date: 2 September 2019

Word count (main): 10,935 Word count (appendix): 2,755

Acknowledgments

I would like to start by thanking my supervisor, Dr. E John Ward for his tireless support and guidance throughout the duration of my research. The breadth and depth of his knowledge was invaluable in guiding this research. To the wider Infrastructure Planning, Appraisal and Development teaching and support staff, thank you for providing me with the necessary tools and support to complete this research. I would also like to thank those in my professional and academic networks who assisted in identifying and introducing key informants. To the interviewees themselves, I cannot thank you enough for donating your time and experience, without which this research would not have been possible. To my employer, North Projects, thank you for assisting in funding the program and making this opportunity a reality. Finally, I would like to thank my friends and family for their endless support over the past few months. Special thanks to dad for his sound research insights, and mum for her excellent editing.

Table of Contents

List of Tables

List of Figures

Abbreviations

EA: Executive Agency

GCI: Global Competitiveness Index

HMT: HM Treasury

IPC: Infrastructure Planning Commission

ISB: Independent Statutory Body

MIP: Major Infrastructure Project

NIC: National Infrastructure Commission

NPPF: National Planning Policy Framework

NSIP: Nationally Significant Infrastructure Project

PI: Planning Inspectorate

ToR: Terms of Reference

UK: United Kingdom

WEF: World Economic Forum

Abstract

This research explores the changing dynamics of major infrastructure planning and appraisal in the United Kingdom (UK). It follows the establishment of the UK's first National Infrastructure Commission (NIC), an independent body with a mandate to provide impartial advice to government on long term infrastructure policy and strategy. This advice must support sustainable economic growth, improve national competitiveness and improve quality of life. To ascertain the performance of the NIC to date, I undertook an audit of the commission. The audit assessed progress against core objectives by examining their work across transport and energy. Specifically, the report: *Transport for a World City* was analysed along with a suite of relevant literature. Ten semi-structured interviews were conducted with key informants who have links to the commission. I show how Thatcherism and the proliferation of neoliberalism in the UK during the 1980s has reduced the role of the state to facilitator. This shift has created a new asset class in infrastructure and enabled global market forces to be embedded at the core of multiple infrastructure sectors. I demonstrate how this shift has paved the way for new forms of governance, manifest as quangos, collectively responsible for the planning, appraisal and delivery of major infrastructure projects (MIPs). I identify several barriers to forming a reliable assessment of the NIC's performance against its core objectives and show how many of the problems it was designed to resolve remain.

1. Introduction

1.1 Context

Major infrastructure is central to the UK's national identity. As the first industrialized nation in the world, major infrastructure has long been a staple of the UK economy. The UK can lay claim to the first passenger rail network opened in 1863, some of the world's earliest power grids, passenger airports and deep-sea ports. Its inter-city road network is traceable to the routes established by the Romans more than two millennia ago (Stuart, 2018). Since its origins, the nature, meaning and role of infrastructure have changed considerably across the UK and globally. Today, infrastructure has a range of definitions, but broadly speaking Bowker *et al.* (2009: 98) define it as the 'pervasive enabling of resources in network form' produced through the delivery of physical transmission and organisational systems. In 2015, spending related to infrastructure totalled US$9.5 Trillion worldwide, or 14% of global GDP (McKinsey Global Institute, 2016). Across the UK projects like HS2, Crossrail 2, the Heathrow Expansion Project and the Thames Tideway Tunnel, highlight a ubiquitous perception that major infrastructure is central to economic development. This perception is echoed in the World Economic Forum's (WEF) Global Competitiveness Report.

As the second pillar of global competitiveness, infrastructure is a key lever for WEF rankings. The UK slipped one spot to 8th in the 2018 Global Competitiveness Report. It is ranked 11 for infrastructure overall, however, it slips to 27 for infrastructure quality and both indexes display a downward trend as spending declines (WEF, 2017: 301). Infrastructure affects all citizens and is a key prerequisite for economic development. When developed sustainably, it can protect the environment and promote efficient use of financial resources (Prof. Klaus Schwab in Weber, Staub-Bisang and Alfen, 2016). This sentiment extends to global investment markets. Only a decade ago, there were less than 15 major global infrastructure investors. Today there are over 200 with total assets under management for unlisted infrastructure funds exceeding £240 Billion (Stuart, 2018). The Infrastructure and Projects Authority national infrastructure pipeline assessment identified a portfolio of over 700 infrastructure projects with a combined value of over £600 Billion (Infrastructure and Projects Authority, 2018). The expansion of infrastructure has contributed to wider societal, political and economic change.

This dissertation will discuss how the proliferation of neoliberalism has fundamentally changed the role of the state and reshaped major infrastructure governance in the UK. Though it is only one of many cogs involved in the new governance system, the NIC has an important role to play

in guiding it. A lack of long-term infrastructure strategy, siloed decision-making, fragile political consensus, and a culture of short-termism have resulted in a new model for major infrastructure policy and strategy across the UK. The NIC plan to resolve these problems by providing clear strategic vision, a structured methodology to consider interdependencies and priorities across sectors, engaging and consulting widely, being ambitious and holding the government to account (NIC, 2018a). This avant-garde approach is welcome. However, it is evident that several challenges need to be addressed to enable the NIC to mitigate the above constraints and deliver on its core objectives to support sustainable economic growth, improve competitiveness and improve quality of life. The decision to renege on the commitment to make the NIC an independent statutory body in light of Brexit, may have been correct at the time, but in order to equip the commission with the tools to do its job and create a sense of permanence, this decision needs to be revisited.

1.2 Research aim & objectives

1.2.1 Research aim

The Armitt Review (2013) suggested that a lack of long-term infrastructure strategy, integrating key sectors and insulated from political volatility was hindering the UK's growth and contributing to a funding shortfall. My aim is to review recent changes to infrastructure policy and strategy in the UK to ascertain the extent to which the NIC can assist in reversing this trend by delivering on its core objectives and fulfilling its obligations as an Executive Agency (EA) of HM Treasury (HMT).

1.2.2 Research objectives

This research will evaluate the performance of the NIC since its establishment against its core objectives. This will be facilitated through an examination of the governance mechanisms and institutional frameworks associated with major infrastructure in the UK. It is anticipated that this will unearth key blocking mechanisms for robust, non-partisan, long-term and cross-sectoral strategies to secure the nation's infrastructure. If successful, this will allow for the prediction of performance moving forward.

1.2.3 Research question

To what extent has the NIC delivered on the following core objectives since its establishment in October 2015:

a. Support sustainable economic growth across all regions of the UK;
b. Improve competitiveness; and
c. Improve quality of life.

In delivering on the above objectives, has the NIC improved major infrastructure policy and strategy in the UK?

a. If so, in what way?
b. Are there specific strategies, policies or tools contributing to this shift?

1.3 Structure overview

To examine this new direction in major infrastructure policy and strategy, three questions were developed:

1. How has major infrastructure policy and strategy changed over the past ten years?
2. Why have these changes come about, and what are the social, economic and political implications?
3. How can they be evaluated?

To answer these questions, I conducted a comprehensive review of literature encapsulating the emergence of the neoliberal state, governance and normative elements of policy evaluation. To contextualise the research, the pathway to the establishment of an independent infrastructure body in the UK is analysed. Publicly accessible grey literature covering policy documents, contractual documents, private and NIC reports were reviewed to trace the origins of the organisation and locate this in the wider political landscape. These topics provide both explanation for the changes and frame the remainder of the paper. A review of the NIC, it's origins, role, and remit – as they relate to these changes – is included. I interviewed key senior staff from both public and private sector organisations involved in the shifting landscape of major infrastructure policy and strategy in the UK.

A case study was used to test the resonance of findings in practice. These are standalone reports produced by the NIC at the request of the government: *Transport for a World City* and, *Smart Power*. The analysis suggests that the steps taken to improve infrastructure policy and strategy have only been partially successful and several barriers remain. Due to the emerging nature of the NIC all findings are preliminary and require further review on the back of the National Infrastructure Strategy (NIS) and as the body matures.

2. Literature review

In this section I examine two sets of literature key to understanding the social, economic and political implications of major infrastructure development in the UK. I begin with a discussion on neoliberalism and governance, to build the foundations for the research. This facilitates an understanding of the changing role of the state in governance of society and the bearing this has on major infrastructure. The second section considers normative aspects of policy evaluation, and a framework for assessing it. The final section aims to synthesise the literature and locate the NIC within a theoretical framework.

2.1 Neoliberalism, governance and major infrastructure in the United Kingdom

2.1.1 Neoliberalism and major infrastructure in the UK

To understand neoliberalism in the context of major infrastructure, neoliberal ideology, policy and governmentality can be compared. Initially developed by Friedman and Hayek in response to deteriorating policies of Keynes' welfare state, neoliberal ideology pushes individual freedoms and free market capitalism in lieu of government intervention (Larner, 2000). This theory was first embraced in the UK by Margaret Thatcher during her Conservative leadership in the 1980s. Neoliberal ideology contrasts with neoliberal policy, which endorses state restructure and expansion. Competitive market global forces and deregulation are perceived as mechanisms to influence government , focus priorities, and facilitate neoliberal policy (Isin, 2016). Such policies can be understood by using the concept of 'actually existing neoliberalism' (Brenner and Theodore, 2002). This allows neoliberal policies to be located within the markets that they operate and highlights the impact of market ideologies, regulatory bodies, macroeconomic trends and markets. The changing landscape of major infrastructure development in the UK and bodies like the NIC can be used to understand the divergence between neoliberal ideology and policy in praxis. In contrast , neoliberal governmentality adopts particular forms of knowledge and rationality to simplify governing populations (Burchell, Gordon and Miller, 1991; Rose-Redwood, 2006). This combats the notion of neoliberalism, often perceived as monolithic in policy, by reducing its scale (Buitenhuis, 2013).

2.1.2 Governance and major infrastructure in the UK

Governance can be applied as an umbrella term for a shift in the nature or meaning of government (March and Olsen, 1989; Jorgensen, 1993). Bevir and Rhodes (2003) assert that such shifts reflect the extents and forms of public intervention in the delivery of public services through markets and quasi markets. In this way, governance covers more terrain than government. It captures the systems and associated stakeholder interactions when any permutation of government, private, and voluntary sectors provide services (Bevir and Rhodes, 2003). Though there is a range of governance definitions, in the context of this research two are relevant: (1) governance as the new political economy and (2) governance as networks and networks as governance.

2.1.3 Governance and the political economy

The first definition explores the government of the economy and the increasingly indistinct boundaries between the market economy, the state and civil society. To unpack this broad classification, positivist and neo-Marxist accounts can be used. The positivist interpretation proposes that 'political and economic processes that coordinate activity among economic actors' drive governance (Campbell et al., 1991: 3). Institutions that govern economic activity are transformed through the emergence and rearrangement of institutional forms of governance. Positivists identify six main mechanisms of governance (ibid.: 29): markets, obligational networks, hierarchy, monitoring, promotional networks, and associations. Discussion on these mechanisms extend beyond the promotion of economic efficiency under certain conditions and considers social control, understood here as the tension between strategic control and power during economic exchange. The state adopts the role of gatekeeper to 'sectoral governance' by promoting or inhibiting, production and exchange (Bevir et al., 2003: 48). Neo-Marxist, Jessop, offers a contrasting view.

Jessop (1999) sees governance as a complex process, which attemtps to steer agencies, institutions and systems. Though these may be operationally autonomous, they are often structurally linked due to a range of reciprocal interdependencies (ibid.). An increasingly global society and rising funtional diversity of institutional and social order, is thought to have catalysed societal complexity and undermined conventional hierachies and top-down coordination (Jessop, 1997). This approach can be differentiated from alternatives through its attempt to put governance in a systematic, broader theoretical framework (Bevir and Rhodes, 2003). It also highlights some critical limitations of governance in addressing problems of coordination, which may be managed more effectively by markets and identifies strategic problems that increase the risk of failure (Jessop, 1997). More recent discussions on governance introduces the idea of networks (Bevir and Rhodes, 2003).

2.1.4 Governance as networks, or networks as governance?

Network analysis emphasizes the importance of maintaining alliances between interest groups and government departments. This process is also referred to as *interest intermediation* (Bevir and Rhodes, 2003). Under this model, policy networks are sets of resource-constrained bodies that manage relationships through power-dependence. Like Jessop's (1999) interpretation of governance, these bodies are constrained by their reciprocal interdependence as they rely on the exchange of resources to meet objectives. These may be financial, political or informational resources that are deployed to achieve desired outcomes, while reducing dependence on other organisations (Marsh and Rhodes, 1992). Theorists of networks as interest intermediation criticise them as they favour individually preferred policy outcomes and prioritise public accountability over private government. This is due to institutional structures that reduce participation, include only narrow actor roles, control actor behaviour through rigid rules and privilege particular interests (Marsh and Rhodes, 1992; Rhodes, 1997). Contemporary research on policy networks locate them at the heart of governance (Bevir and Rhodes, 2003).

There are two key schools of thought in the literature on policy networks. (1) Power dependence; and (2) rational choice. Under power dependence, networks provide the means for the coordination and allocation of resources between agencies. This is achieved through the same structures as markets and bureaucracies. In this model, governance consist of self-organising, interorganisational networks characterised principally by the interdependence between organisations (Bevir and Rhodes, 2003). The state's reduced role blends public and private boundaries. There are frequent interactions between network members to exchange resources and negotiate shared purpose. These interactions resemble actor games' behaviour rooted in trust and regulated by rules that are negotiated and agreed by network participants (ibid). Such networks often experience a significant degree of autonomy from the state. They are not accountable to the state; they are self-organising. The state is only able to indirectly and imperfectly steer networks, and this is a central issue confronting government. Both schools of thought agree that governance as networks is both common and critical to advanced industrial societies – of which the UK is one of the largest – which have experienced a significant shift in state and civil society dynamics (Bevir and Rhodes, 2003).

Neoliberalism and governance help to understand the changes to major infrastructure policy and strategy in the UK. These shifts can be tracked against wider societal changes to the nature and meaning of government, and contemporary structures of governance, as is discussed under research methods. To ascertain the performance of the NIC in improving major infrastructure policy and strategy, normative aspects of policy evaluation and a corresponding framework are introduced below and will be operationalised in the analysis section.

2.2 Normative elements of policy evaluation

Evaluation is central to safeguarding holistic policy success. The United Nations Development Program (UNDP) Handbook on Planning, Monitoring and Evaluation (2009: 8) defines evaluation as 'a rigorous and independent assessment of either completed or ongoing activities to determine the extent to which they are achieving stated objectives and contributing to decision making'. They highlight the importance of evaluation by identifying the following interdependencies between planning, monitoring and evaluation:

- 'Without effective planning (clear results frameworks), the basis for evaluation is weak; hence evaluation cannot be done well;
- Without careful monitoring, the necessary data is not collected; hence evaluation cannot be done well;
- Monitoring is necessary, but not enough, for evaluation;
- Monitoring facilitates evaluation, but evaluation uses additional new data collection and different frameworks for analysis; and
- Monitoring and evaluation of a programme will often lead to changes in programme plans. This may mean further changing or modifying data collection for monitoring purposes' (UNDP, 2009: 8).

Though evaluation is a key component to policy success, it is dependent on planning and monitoring and so should not be implemented in isolation. HMT's guidance document for evidence-based appraisal and evaluation of proposals, *The Green Book*, recommends the collection of *ex ante* data before implementation to 'act as a baseline' for *ex-post* evaluation (HMT, 2018: 7). HMT's guidance document on evaluation, *The Magenta Book* (2011), sets out best practice strategies for comprehensive evaluation of policies, programmes and projects. In it, they introduce a broad policy cycle that, if followed, should mitigate project inefficiencies through monitoring, evaluation and feedback as shown by Figure 1.

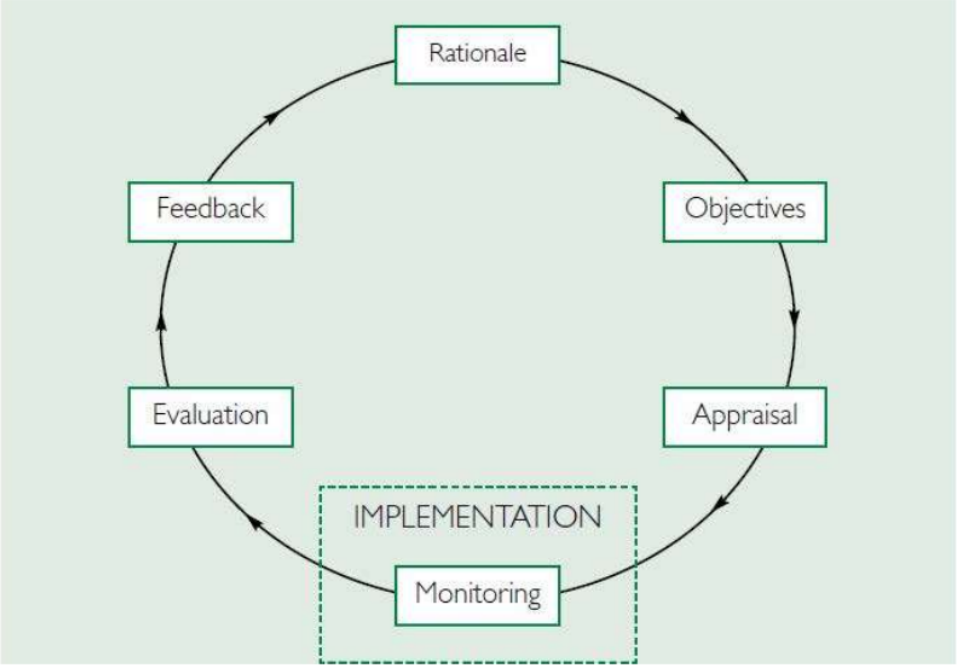

Figure 1: The ROAMEF policy cycle

(Source: Roamef, 2019)

In the ROAMEF scenario, evaluation is considered the mechanism by which policy effectiveness and efficiency is measured and should be completed before and after policy implementation (ibid.). The UNDP have developed their own results-based model (RBM) life cycyle approach as distinct from the ROAMEF process. This is depicted in Figure 2 and though there are several similarities, a key distinction is the explicit inclusion of stakeholder participation at the core of the process.

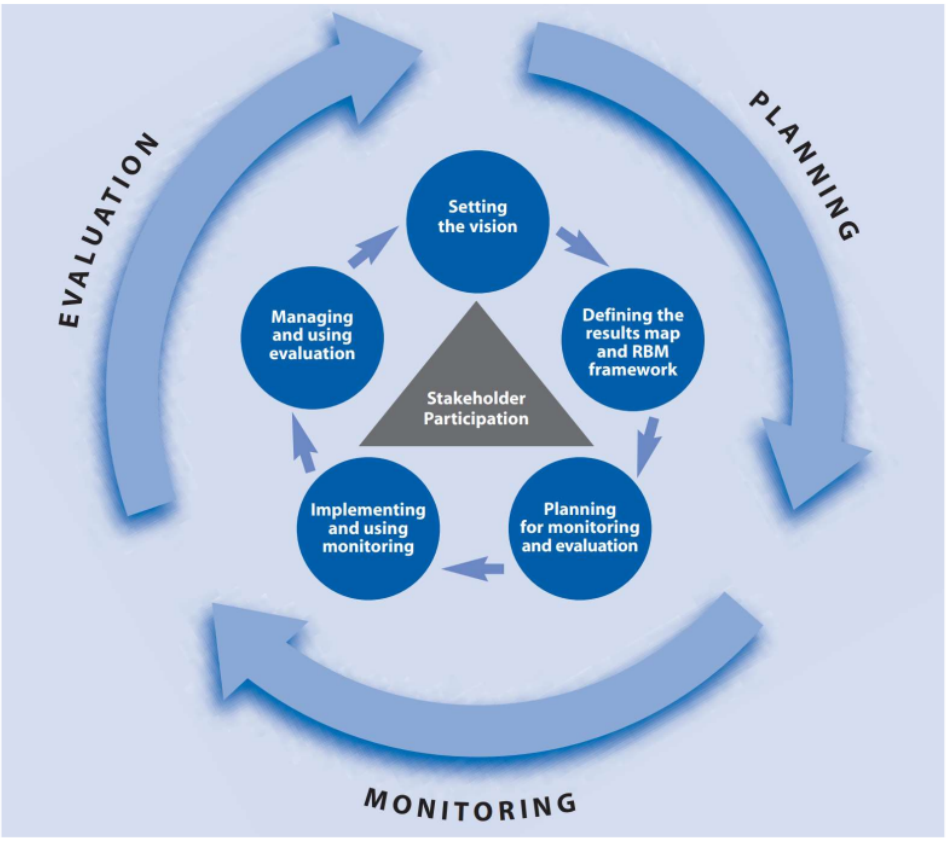

Figure 2: The RBM approach

(Source: United Nations Development Programme, 2009)

Sabatier and Mazmanian (1980) introduce a broad framework for the evaluation of policy implementation. Their model attempts to analyse the success of policy implementation process by analysing the following three factors: (1) the tractability of the problem/s being addressed by the policy; (2) the ability of the policy to favourably structure the process; and (3) the net effect of political variables on the balance of support for policy objectives (Sabatier and Mazmanian, 1980: 541). The tractability of the problem is assessed through the availability of valid technical theory. The ability of the policy to structure implementation can be measured by the ambiguity of policy directives. The net effect of political variables on the balance of support can be derived from media rhetoric surrounding the problem and public support (ibid.). These tests will be applied to the case study, *Transport for a world City,* commissioned by HM Treausry and completed by the NIC. The tension will be in assessing whether they are likely to fall victim to the gradual erosion scenario or experience the successful scenario, depicted in Figure 3Figure 4

respectively. In applying these stress tests, the likely performance of NIC policies can be extrapolated and possible risks identified.

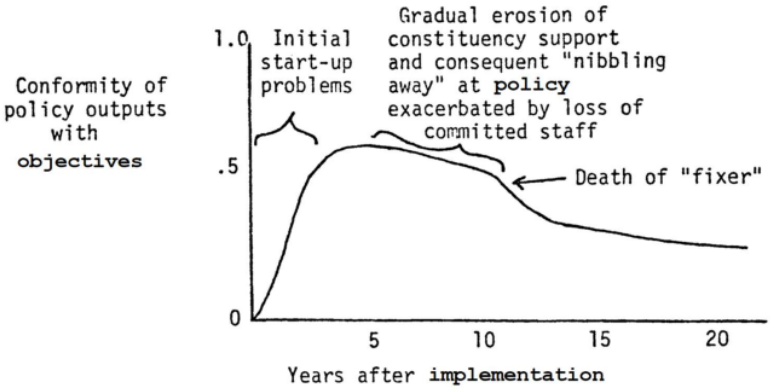

Figure 3: The gradual erosion of policy scenario

(Source: Sabatier and Mazmanian, 1980)

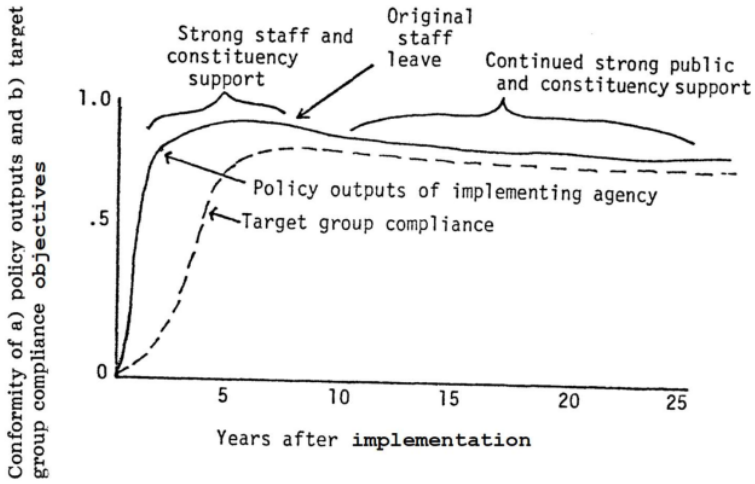

Figure 4: The successful delivery of policy scenario

(Source: ibid.)

2.3 Weaving it all together

Though the substantive academic account on the success of the NIC remains to be seen, older similar bodies such as the Greater London Authority (GLA) have been subject to much criticism academically. Rydin et al. (2002), Thornley et al. (2002) and West et al. (2002) have criticised the body as an inefficient overlapping of institutions, which prioritises business interests over the public and is incapable of coordinating strategy. It is anticipated these same limitations may be experienced in the case of the NIC following the rise of the neoliberal state and the emergence of new forms of governance. The dismissal of links between major infrastructure and actually existing neoliberalism as the product of privatisation, allow the state to avoid fundamental questions and risks. Of interest is the role of the private sector in shaping major infrastructure policy and strategy and the commission's ability to execute its strategies. This will be tested, in part, by examining the presence of HMT and UNDP recommendations for best practice evaluation and assessing the resonance of key themes from Sabatier and Mazmanian's (1980) policy evaluation framework. This illuminates the extent to which NIC policy interventions have assisted in meeting their core objectives to support sustainable economic growth, improve competitiveness and improve quality of life.

3 Research methods

3.1 A three-stage, inductive investigation

This section will outline the methods used and barriers encountered in responding to the primary research questions of this dissertation:

1. How has major infrastructure policy and strategy changed over the past ten years?
2. To what extent has the NIC delivered on its core objectives to support sustainable economic growth, improve quality of life and competitiveness?
3. Has the NIC improved major infrastructure policy and strategy in the UK?

I will also outline the steps taken to gather qualitative data on major infrastructure policy and strategy in the UK, and the perceived role and performance of the NIC.

The research phase ran from May 2019 to September 2019. An inductive research method was adopted to identify generic and emergent themes and lessons from the literature in praxis through a series of interviews. Secondary materials including academic literature, government documentation/reports, private sector insights and online media were used as additional data sources as is necessary for robust qualitative analysis (Boyne, 2003). Content analysis was facilitated using NVivo. The substantive research methodology can be broken down into five stages and was adapted from the research of Carmona et al. (2017) on the effectiveness and legitimacy of the former Commission for Architecture and the Built Environment.

3.1.1 Stage 1: Constructing the analytical foundations

The first step was to establish a baseline understanding of international neoliberalism and governance literature particularly as this relates to major infrastructure policy and strategy, and the NIC. This was achieved by:

- Establishing the context by identifying how major infrastructure policy and strategy is approached by public policy and politics more broadly; and
- Uncovering the original NIC narrative in professional/academic literature and news media.

This was facilitated through an extensive review of grey literature. Specifically, government policy documents, private sector reports and Financial Times coverage since 2015. The discussion on neoliberalism and governance allowed for the NIC to be explained in broad

theoretical terms, however, to facilitate an evaluation of its performance against core objectives, normative aspects of policy evaluation and a corresponding framework for testing these were introduced. This constituted the analytical framework or set of lenses through which the performance of the NIC was evaluated.

3.1.2 Stage 2: Interrogating the organisation

The second step was to review key documentation produced by the NIC. This included but is not limited to: remit letters, their charter, terms of reference, the framework document, consultation documents, consultation responses, blogs, conference proceedings, blogs and their reports: Transport for a World City, Smart Power, and the National Infrastructure Assessment. Document analysis was completed using NVivo software to juxtapose the NIC against the wider political and urban policy context. The outputs of this stage included:

- Organisational maps illustrating the NICs development and how this linked with broader external political priorities and pressures.;
- An account of NIC tools, programmes, projects, and relationships;
- A review of key outputs from NIC programmes; and
- A snapshot of how the organisation itself operated, established priorities, allocated resources and measured success.

3.1.3 Stage 3: The interviews

Following the completion of stage 2, the third step was to conduct semi-structured interviews with two main groups: public and private sector bodies involved in the development of major infrastructure policy and strategy. The purpose of this stage was to:

- Address primary research questions;
- Test the resonance (and in so doing accuracy) of stage 2 findings;
- Identify any political, organisational, resourcing, professional and practical drivers and barriers for the NIC;
- Understand the support given to and critique of the commission and its work, and the basis for such opinions; and
- Identify key successes and failures to allow for an assessment of likely future performance.

With assistance from the snowballing technique (Atkinson and Flint, 2001), representatives from the below stakeholder groups were initially contacted:

Table 1: Planned interview groups

NIC	Westminster & Croydon City Council
HMT	University College London (UCL)
IPA	European Investment Bank (EIB)
Transport for London (TfL)	Global Asset Managers & Investors
Crossrail2	InfraRed Capital Partners

Each of these groups have links to the NIC and contribute to major infrastructure policy and strategy in different ways. From this list, the following groups and associated affiliations were able to be brought into the research:

Table 2: Actual interview groups

NIC: Executive, Board, Secretariat, Young Professionals Panel (YPP)	UCL: Visiting Professor in Planning
HMT: Head of Economics Branch	EIB: Former Urban Specialist
Crossrail2: Transport Planning Manager	Global Asset Manager: Asset Director

The questions were developed following an extensive review of literature and designed to tap into common misgivings and frustrations associated with major infrastructure policy and strategy in the UK. A pilot study was conducted with an NIC commissioner to assess relevance, depth, breadth and clarity of the questions. Upon reflection, minor modifications were made to increase clarity, reduce potential leading and eliminate bias. The final questionnaire can be viewed in appendix A.

I considered myself at (different) times both insider and outsider, which provided access to sensitive information as well as that which would not typically be shared with insiders at different levels of the organisation. I endeavoured to occupy 'positional space' to create fluid, transitory interviews that enabled new unfamiliar landscapes to be understood (Mullings, 1999: 340; Kvale, 2007). On the basis that knowledge is socially constructed, informants' roles and identities emerged from relating responses to their lived experience rather than gathering objective data. This qualitative approach allowed for the construction of individual narratives, which formed a broad account of major infrastructure policy and strategy across the UK, the performance of the NIC to date, and potential challenges and opportunities into the future.

3.1.5 Stage 4: The cases – Transport for a World City & Smart Power

I initially planned to include one report by the NIC as a case study, *Transport for a World City*, but was advised by a current executive there that *Smart Power* should be incorporated "to get the full picture". As such, I included this secondary case study in interviews; however, due to the constraints of this research project, I only touch on it briefly in section 5.

3.1.6 Stage 4: Analysis

In synthesising steps 1 to 4, findings were triangulated to identify common themes and patterns inductively. By employing the techniques listed above a robust, rounded assessment of the NIC was completed. Section 4 and 5 will discuss substantive finding and the sources underpinning each point.

4. The road to an independent infrastructure body

4.1 The decentralization of major infrastructure planning in the UK

The decentralization of major infrastructure planning in the UK is synonymous with the 2008 Planning Act. It was introduced following the Eddington Transport Study (2006), which identified a number of constraints hindering Nationally Significant Infrastructure Projects (NSIPs). Most pertinent were a lack of public policy integration, clear contribution to the national economy, cost uncertainty, planning delays, public consultation and engagement, and compatibility with EU law. There were multiple recommendations, however, the solution discussed here is the standalone consenting process for infrastructure projects of national importance. Under this model, the Labour government introduced an Infrastructure Planning Commission (IPC) to examine and make final decisions on schemes over certain thresholds (Marshall, 2011; GOV.UK, 2012b). Unlike the 1990 Town and Country Planning Act, examinations became inquisitorial rather than adversarial. Instead of asking ***if*** the project should be implemented, reviewers began to ask ***how*** it should be implemented (DCLG, 2008). Consistent with Table 3, the last decade has seen the establishment and dissolution of several government bodies. The most recent changes key to this discussion occurred around the passing of the 2011 Localism Act and shortly after a change in government that saw economic benefits and concerns placed at the forefront of the conservative manifesto and the planning system (Imrie and Lees, 2014; Barber, 2017).

Under new Conservative leadership, the IPC was abolished and absorbed by the PI, transferring final decisions back to ministers (Marshall, 2011); the National Infrastructure Commission was established on the back of the Armitt Review (2013); and Infrastructure UK (IUK) and the Major Projects Authority (MPA) merged to become the Infrastructure and Projects Authority (IPA). Together, these bodies are responsible for the planning, appraisal, and delivery of the UK's major infrastructure (public facing). This discussion is limited to infrastructure policy and strategy, the primary architect of which is the NIC. Ensuing discussions are limited to the front-end strategy and policy associated with major infrastructure, which in recent years has been encountering the same stumbling blocks despite several changes.

Table 3: A comparison of recent bodies responsible for the planning, appraisal and delivery of major infrastructure in the UK

Body	Start	End	Scope	Status / Footing
Infrastructure Planning Commission (GOV.UK, 2012b)	2008	2012 Abolished	Examine and under certain circumstances decide on proposed nationally significant infrastructure projects.	Non-departmental public body.
Infrastructure UK (Infrastructure UK & HMT, 2010)	2010	2016 Merged with MPA	Enable private sector investment in infrastructure and improve the long-term planning, prioritisation and delivery of infrastructure.	Division of HMT.
Major Projects Authority (Cabinet Office, 2011)	2011	2016 Merged with IUK	Assurance for each major project or programme; Intervene in projects that are failing through commercial and/or operational support; Develop skills and expertise in projects and programme management across departments; Publish an annual report covering all major projects.	Mandate from the PM.
Planning Inspectorate (GOV.UK, 2019)	2012	NA	Planning appeals, NSIP planning applications, examination of local plans.	Executive Agency of Ministry of Housing, Communities and Local Government.
National Infrastructure Commission (HMT, 2016)	2015	NA	Assess long-term national infrastructure needs. Undertake evidence-based research. Offer recommendations on the most pressing infrastructure challenges nationally.	Executive Agency of HMT.
Infrastructure and Projects Authority (Infrastructure and Projects Authority, 2017a)	2016	NA	Oversee the whole project lifecycle of major projects. Key responsibilities incl. project support and de-risking, skills and capability development and ex-post evaluation.	Alliance between the Cabinet Office and HMT.

4.2 A history of over politicisation, siloed decision-making and short-termism

To succeed in executing major infrastructure policy and strategy, it is critical to develop an acute understanding of the anatomy of decision-making at the outset. This is most aptly described as the turbulent environment in which the project is taking place, namely the societal and city context (Allport, 2011). An awareness of such context is central to successful decision-making and subsequently successful projects (Dimtriou, Wright and Ward, 2011). Both Allport (2011) and Marshall (2012) consider major infrastructure to be pervaded by implicit stakeholders, namely, politicians. Though this is context dependent and varies considerably by location, scale and sector, politics and personalities permeate nearly all major projects by guiding governmental and political processes. DLA Piper (2018: p.3) found through a survey of 50 infrastructure investors at portfolio manager level that 84% feel infrastructure in the UK is too politicised. Interestingly, the most unanimous response was the need to place the UK's new independent infrastructure body, the National Infrastructure Commission (NIC) on a statutory footing, which was supported by 91% of respondents (ibid: 9). The work by DLA Piper on overpoliticisation noted above is evidence of this. Politicians are key to the early success of major projects due to their role in gathering sufficient momentum to get the necessary support and approvals to begin (Snowy Mountain Engineering Company, 2001). The government believes these contextual issues are threatening major infrastructure policy and strategy, and urgent sweeping changes are required to address them. The first step is the establishment of an independent infrastructure body.

5. The National Infrastructure Commission

The NIC first came into the public discourse when The Rt Hon George Osborne announced the Conservative Parties' four-point plan to get Britain building. Housing, British wealth funds, asset sales, investment and the NIC will improve the way major infrastructure projects are planned, determined and funded. Of the NIC, he said (GOV.UK, 2015a);

> "a new independent NIC is being created today. It will be charged with offering unbiased analysis of the UK's long-term infrastructure needs. The NIC will begin work immediately. Lord Andrew Adonis will lead the Commission as its first chairman".

Lord Adonis, followed by stating (GOV.UK, 2015a);

> "A long-term strategy for investment in infrastructure is vital to maintaining the UK's competitiveness amongst the G20 nations and to provide greater certainty in support of a long-term approach to the major investment decisions facing the country'. 'I will ensure that the Commission places the needs and views of the UK public at the heart of a long-term strategy".

Established as an Executive Agency of HMT in October 2015, the case for the NIC is summarised below:

Table 4: The case for an independent infrastructure body

Problems	**Solutions**
Lack of long-term strategy leading to a piecemeal approach	A clear strategic vision, encompassing all infrastructure sectors
Siloed decision-making with no common approach between sectors	A structured methodology to consider interdependencies and priorities across sectors
Fragile political consensus and short-term considerations cause uncertainty for investors	Propose recommendations consistent with a long-term objective
Lack of transparency, inadequate consultation and engagement which hinder consensus	Wide engagement and consultation
Innovative solutions and risky ideas are politically difficult decisions to take	Consider all potential solutions, including challenging ones
There needs to be better consideration across sectors of the UK's carbon targets	Assessment will be compatible with all legally binding and long-term obligations including carbon targets
Government not held to account for delivering infrastructure	Objectively scrutinise Government action

(National Infrastructure Commission, 2018a: 28)

Following a comprehensive review of grey literature relating to the development of the NIC, a timeline began to emerge. This, along with upcoming (and missed) milestones and key work completed to date, is included in Appendix B. Upon review, it quickly becomes apparent that the first 4 to 5 years were perforated by turbulence, however, this also demonstrates the impressive resilience of the commission to date.

5.1 A shaky start

A fragile post-Brexit political landscape generated an unsteady beginning for the NIC. Its formation was largely consistent with Figure 5, except that it was not granted statutory independence and instead created as an EA of HMT. This was in direct conflict with the consultation on NIC governance, and subsequent government correspondence – including the Queens address – which came out in clear support of placing the body on a statutory footing (GOV.UK, 2016: 7; GOV.UK, 2016c; GOV.UK, 2016e). Notwithstanding, according to participant A:

> "The plan was, before the resignation of David Cameron and when George Osborne was Chancellor, that it would be statutory. After the [Brexit] referendum, when it became clear there would be a huge amount of stuff that had to go through parliament, and we had a change in prime minister and chancellor, they took a different line on our footing."

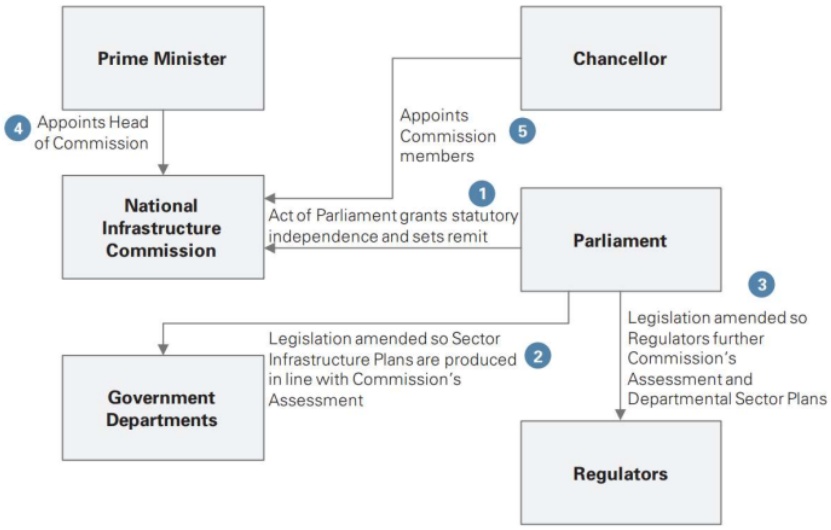

Figure 5: Proposed NIC establishment process per Armitt Review recommendation

(Source: Labour's Policy Review, 2013).

Despite the decision to make the body an EA, 50% of informants believe the NIC is still independent. According to participant C:

> "We signal our independence in other ways…the Charter wording 'the NIC will have complete discretion to determine independently its work programme, methodologies and recommendations, as well as the content of its reports and public statements' is stronger in some cases than what would have been in the bill…I think it's very important to be clear that statutory status is not in any sense a fallacy of political interference. There are plenty of ways the government can make our life difficult."

In contrast, informants who felt the NIC had lost its sense of independence following the renege raised this more frequently.

Executive Agencies have been a key cog in UK politics since the report, *Improving Management in Government: The Next Steps*, in 1988 (Cabinet Office, 2018). They were developed to deliver the executive functions of government in a policy and resources framework set by – but distinct from – a policy-focused department. Figure 6 depicts the decision-making process followed by government to determine the appropriate classification of public bodies. Interestingly, multiple informants with direct affiliation to the NIC described the body as "operationally autonomous". Though this aligns with Jessop's (1999) theory of governance, it conflicts with the Cabinet Office classification as illustrated below. The decision tree suggests that operational control is reserved for non-departmental public bodies.

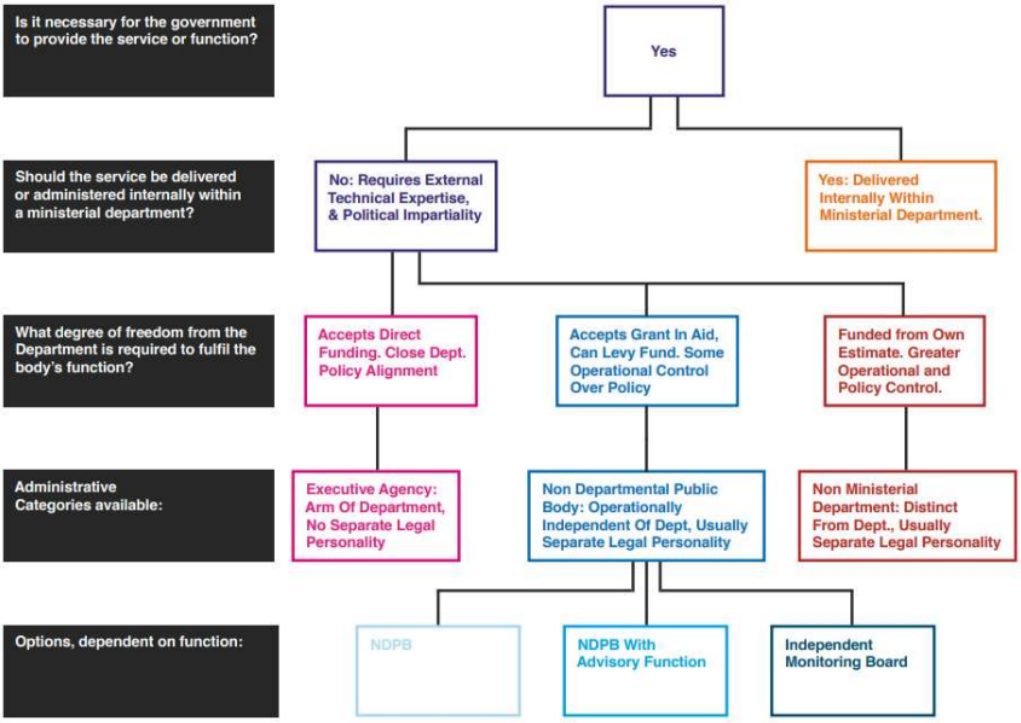

Figure 6: A decision tree for the administrative classification of public bodies

(Source: Cabinet Office, 2018)

Interestingly, those who felt the NIC retained its independence as an EA also felt the decision had positively impacted their work to date. It allowed them to start work immediately rather than being delayed by parliamentary proceedings at a time when uncertainty and change were at peak levels. As participant D noted:

> "I think it had a positive impact on our work, because it meant that we could get on with it. We didn't have to wait around for the government to pass a bill. We didn't have uncertainty. It also made it easier to find staff, because we all remain civil servants. If we were placed on a statutory footing our status would have changed."

The NIC Charter states that the commission is a 'permanent body which will provide the government with impartial, expert advice on major long-term infrastructure challenges' core objectives are to (HM Government, 2016: 1):

- Support sustainable economic growth across all regions of the UK;
- Improve competitiveness; and
- Improve quality of life.

These objectives are expected to be captured through an assessment of national infrastructure needs which will be completed once every parliament. This involves the completion of in-depth studies on the most urgent infrastructure challenges in the UK, making recommendations to government, and monitoring the progress of infrastructure projects and programmes recommended by the NIC (Infrastructure Commission, 2018). There is tension between clarity of purpose and objectives; informant responses surrounding the role of the commission are summarised in Table 5.

Table 5: A summary of informant responses to the role of the commission

NIC role as described by informants	Frequency
Developing future infrastructure strategy	31%
Influencing and advising government	19%
Holding the government to account	17%
De-politicise major infrastructure	14%
Improve infrastructure decision-making	8%
Taking a holistic view on infrastructure	6%
Value for money prioritisation and strategy	6%

The commission's work is supported by the UK government. Consistent with the framework document, this is achieved through formal responses to all NIC recommendations with a clear statement of acceptance or rejection. In cases where the government disagrees, supporting evidence must be provided and where appropriate alternative proposals for meeting the identified need raised (HMT, 2017). This culminates in the form of a National Infrastructure Strategy (NIS) issued in response to the commissions National Infrastructure Assessment (NIA). This is should be issued in six months but in any case, not later than a year (HM Government, 2016a). It is anticipated that the above framework will allow the NIC and subsequently central government to systematically reduce risk and uncertainty and provide commercial investors with the confidence required to invest sufficiently (NIC, 2018). Concurrently, it should facilitate the delivery of the above three core objectives.

Following a surprise snap election in 2017, the first NIA was published two years faster than normal on 10 July 2018 (BBC News, 2017; NIC, 2018). Despite the governments purported support and alleged firm commitments formalized in the NIC Charter, the government missed six- and twelve-month milestones. The third Chancellor since its conception, Sajid Javid, announced: "it will be published alongside the autumn statement later this year" (Institute of Civil Engineers, 2019). With respect to NIC recommendations and how these will be taken forward as part of the NIS, there is still considerable uncertainty. As noted by participant D:

> "We're not worried about whether they're going to respond, we are worried about the quality of their response… [will it] engage with the arguments, logic, rationale and evidence that the NIA contains, which challenges quite a lot of what government policy is built on".

All research participants expressed concern over the uncertainties, delays and flow on effects. Links can be drawn between these concerns and the reciprocal interdependencies identified by Jessop (1999). Here, these are manifest in the commission's structural links to other government bodies that may at times constrain progress, in this case the NIS. A process that is largely out of the NIC's control but with considerable impacts on their future.

5.2 Governing the UK's first independent infrastructure body

Consistent with Figure 7, the NIC adopts the Cabinet Office's second model of governance. This implies independence from HMT with assurance provided by a board. However, the sponsoring minister:

- 'is responsible for the policy framework within which the agency operates;
- Determines its strategic objectives and ensure that it achieves them and delivers value for money;
- Approves the agency's corporate plan and (where proportionate) business plan; and
- Appoints the agency's Chief Executive and Chair and approves the appointment of non-executives' (Cabinet Office, 2018: 6).

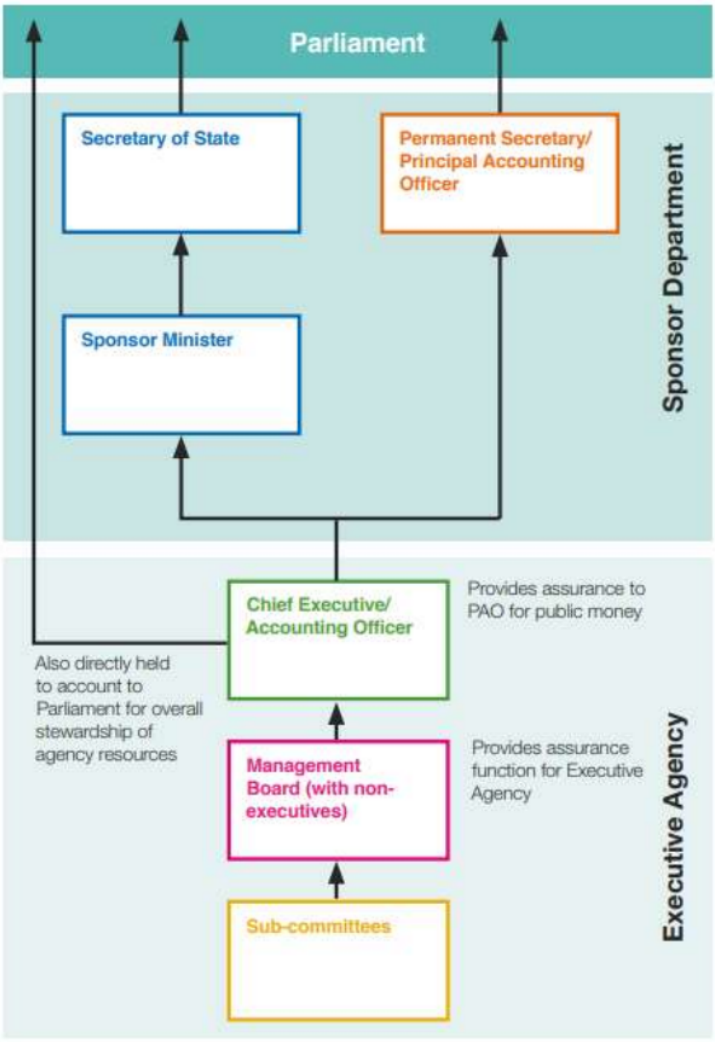

Figure 7: The high-level governance structure of the NIC

(Source: Cabinet Office, 2018: 7)

Consistent with other executive agencies, the NIC can be subject to merging, transferring or closure, following a review by their parent department. Any decision must be rooted in a thorough review and evidence (Cabinet Office, 2018). The government has a history of abolishing other QUANGOS like the NIC following political change. Examples include the Commission for Architecture and the Built Environment, and the Royal Commission on Environmental Pollution, which were both closed in 2011 following coalition budgetary cuts (Owens, 2015; Carmona, De Magalhães and Natarajan, 2017). Notwithstanding, should HMT decide to abolish the NIC, it

would be reinforcing the original *raison d'etre* for an independent infrastructure body in the first place: over-politicisation, siloed decision-making and short-termism. The commission has made some progress in addressing these issues and may have developed a strong platform for fostering economic prosperity, improving quality of life and competitiveness, however, it's clear considerable work remains.

5.3 Measuring infrastructure performance to enable the measurement of NIC performance

The commission considers current efforts to assess infrastructure quality, such as those completed in the World Economic Forum's Global Competitiveness Index (GCI), as inadequate, based on either perceptions or levels of expenditure (NIC, 2018a). The GCI utilizes 114 indicators that collectively provide a snapshot of productivity and long-term prosperity. The WEF define competitiveness as the 'set of institutions, policies, and factors that determine the level of productivity of a country' (WEF, 2018: 43). The premise adopted here is that productivity and prosperity are positively correlated, in other words, productivity and prosperity drive growth rates. The GCI is calculated by measuring the weighted average of a range of components, which together make up the 12 pillars of competitiveness as shown in Figure 8 (WEF, 2018).

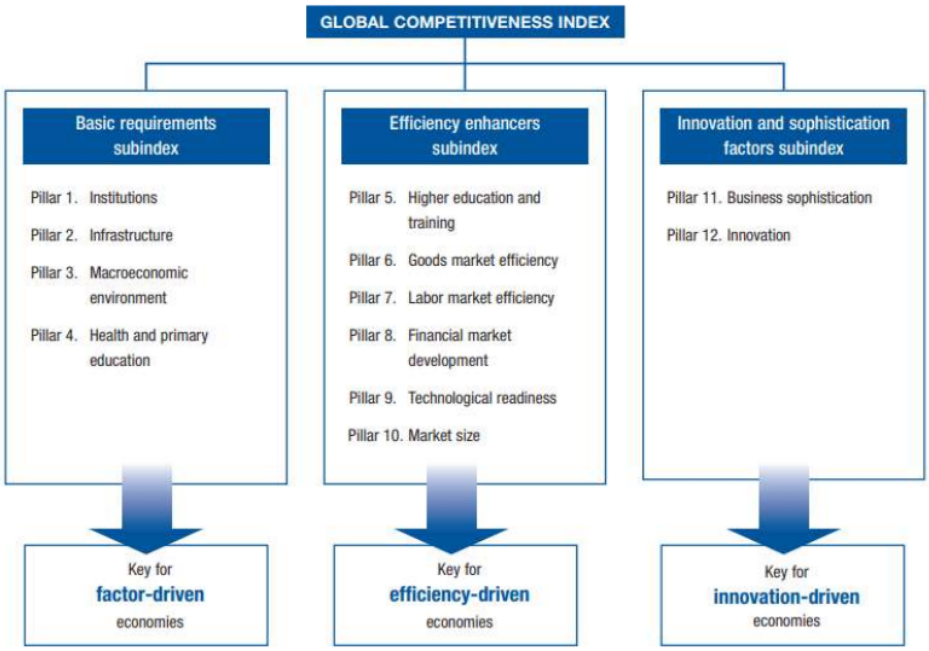

Figure 8: The GCI framework and 12 pillars of competitiveness

(Source: World Economic Forum, 2018)

In the context of this research, pillars 1 and 2, institutions and infrastructure are most relevant. The institutional environment is dependent on the efficiency and behaviour of public and private stakeholders. The quality of public institutions is driven by the 'legal and administrative frameworks within which individuals, firms, and governments interact' (WEF, 2018: 317). This not only has a strong bearing on competitiveness, but also effects investment decisions and the distribution of the benefits and costs of development strategy or policy. The second pillar, infrastructure, is considered critical by the WEF and should be extensive and efficient to ensure smoothly functioning economies. It is central to the timely movement and marketing of goods and services and the free flow of information, which drives economic efficiency and facilitates quick and informed decision making (ibid.). When you focus in on infrastructure there is a clear lack of systemic analysis. Noting this, and the absence of any alternative cross-cutting performance measurement models for infrastructure globally, the NIC has endeavoured to develop the first. They are committed to establishing clear metrics, which enable infrastructure performance to be assessed and tracked across the six sectors within their remit: transport, energy, waste, water and waste water, flood risk and digital communications (NIC, 2018a). After all, and as noted by participant A:

> "Unless you've got some metrics on the effectiveness of the infrastructure, it's hard to have any metrics on our own effectiveness in promoting it".

The hope is that an evidence-based understanding of current infrastructure system quality, using multi-scale infrastructure systems analytics, will simplify the assessment of future need (Lovrić, Blainey and Preston, 2017). By understanding the performance of each system over time, decision-making can be improved and an assessment of the commission's performance against core objectives can be made (National Infrastructure Commission, 2018b). Critically, these measures go beyond conventional iron triangle principles of cost, time and scope (Dimitriou, Ward and Wright, 2013; Atkins *et al.*, 2017). It is noted that the performance measures are one of many inputs informing decision-making on major infrastructure in the UK and should not be viewed in isolation. Table 6 displays an extract of the NIC's proposed performance measures matrix. A complete framework can be viewed in appendix C.

Table 6: A summary of performance measures for transport and energy

Domain	Sub-domain	Transport	Energy
Volume	Volume of consumption	Passenger/tonne km travelled	Energy consumed
		Number of journeys	NA
Resilience	Resilience to large shocks	Stress test	Stress test
			Capacity margin Expected loss of load
	Everyday resilience	Travel time reliability	Time that properties lose access to energy
Quality	Service quality	Connectivity	NA
	Quality of user experience	Satisfaction derived from survey	Satisfaction derived from survey
		Design quality	Design quality
Cost	Cost	Cost per passenger/tonne km	Cost per kWh of energy
			Average annual energy bill
Environment	Emissions	CO2 emissions per passenger/tonne kilometres	CO2 emissions per kWh used
		Total CO2 emissions from transport	Total CO2 emissions from energy
	Environmental externalities	Air quality	Air quality
		Noise	
	Natural capital	NA	Value of energy services provided by natural environment
			Cost that energy services impose on the natural environment
Efficiency	System efficiency	Congestion	Energy efficiency of buildings Transmission / distribution losses Ratio of average to peak demand

(Source: NIC, 2018b)

The commission is reliant on a range of other public bodies for input data. These include the Department for Transport, National Rail, Department for Business, Energy and Industrial Strategy the Department for Environment, Food and Rural Affairs, National Grid, Ofgem, and the Office for National Statistics (NIC, 2018). This creates dependence and uncertainty regarding data quality. For example, DfT data suggests that the total number of journeys taken across Britain has remained unchanged at 8.3 billion since 2014 (excluding 2015/16 as this data was

not provided). Given there has been a 4% increase in population over the same period this seems unlikely and casts doubt over data accuracy (Trading Economics, 2019). Complexity is also derived from comparing sectors as they require different metrics. Moreover, connecting domains to commission objectives is difficult in the absence of clear definitions endorsed by the commission with underlying metrics for sustainable economic growth, quality of life and competitiveness. Notwithstanding, the performance measures do show signs of a high-level narrative emerging by isolating big-ticket items. These are summarised in Table 7.

Table 7: A summary of big-ticket items for transport and energy

Transport		**Energy**	
Big-ticket item	**Problem**	**Big-ticket item**	**Problem**
Freight	Increasing emissions	Energy bills	They're increasing
A-roads	Delays increasing	Building efficiency[1]	56% below C-grade
Inter-urban connectivity[2]	Average connectivity @ 5%	Capacity margin[3]	Decreasing
Emissions from transport as a whole	@ 1990 levels	Renewable energy sources	Asset value outweighed by oil & gas

Despite some limitations, the framework has been – at least – partially successful in establishing a baseline for past infrastructure performance across the six sectors mentioned on page 34 earlier. Pre-existing gaps in metric data relating to design and resilience have been innovatively filled and several modifications have already been made following extensive consultation. Challenges to completion do not originate with the commission itself but are derived from structural dependencies, institutional strength and data reliability. To understand how this framework will be integrated with projects completed by the NIC, it was overlayed on the case study, *Transport for a World City*.

[1] Building efficiency is graded A to G. Below C-grade is sub 69/100 (Energy in Demand, 2019).
[2] The effectiveness of the network at getting people from A to B (NIC, 2018)
[3] As this margin decreases, the risk of system demand outweighing supply increases (Royal Academy of Engineering, 2013)

6. Case study

6.1 *Transport for a World City* & the case for Crossrail 2

In March 2016, the government requested that the NIC review the strategic case for additional large-scale transport infrastructure across greater London. Recommendations should be based on an 'equal and balanced consideration of all available evidence and options' (HMT, 2015). This review primarily covered the proposals for a new north-east to south-west railway line colloquially known as Crossrail 2 (HM Government, 2016b). The project cost is forecast to exceed 30 billion, over twice the cost of its problem-riddled predecessor, Crossrail (Crossrail 2, 2019b). The preferred route for the new line is identified in Figure 9.

Figure 9: Proposed map of the preferred regional option

(Source: NIC, 2016)

London is experiencing unprecedented levels of population and employment growth, and transport systems are struggling to keep pace with these challenges. The population is expected to be ten million by 2030, earning London megacity status (NIC, 2016). There is a range of arguments for Crossrail 2, but the commission boils it down to four key issues, which can be mitigated by the project:

1. Crowding on underground lines;
2. Lack of capacity on commuter service rail routes and at major Network Rail stations;
3. Insufficient orbital links particularly in East London; and
4. The need for transport to promote significant housing growth within and around the capital (NIC, 2016: 4).

The project is expected to create opportunities for 200,000 new homes, support 60,000 new jobs during construction and 200,000 once complete, increase London's rail capacity by 10 per cent and allow for 270,000 more passengers at peak times (Crossrail 2, 2019a). It is unclear if the jobs are genuinely new jobs or will draw resources from other areas leading to potential losses in productivity in another area i.e. no net gain (Kanemoto, 2013). Nonetheless, the proposal for an underground line, linking south-west and north-east London, is not new.

6.2.1 Timeline

The project can be traced back to the 1944 Greater London Plan, which introduced a west to north-east line through a world-first cross-London tunnel (Crossrail 2, 2019). This was not acted on and, despite cropping up multiple times between 1944 and 2008, consultation on short-listed options did not begin until 2013 (The Royal Borough of Kensington and Chelsea, 2007; Crossrail 2, 2019). The project business case has been through multiple iterations since the original publication in 2014, but full and current versions are not in the public domain. Following the NIC's assessment, an independent affordability review, and in light of Crossrail 1's ongoing issues, the project company is preparing to submit its fifth business case in the hope of submitting a hybrid bill to parliament in 2021 (Ashwell, 2019; Crossrail 2, 2019). For a comprehensive project timeline please refer to appendix D. Despite support from the NIC, the projects future is still uncertain.

6.2.1 NIC recommendation

Following an assessment of the business case for Crossrail 2, the NIC came out in strong support of the project's regional option, with a few caveats. The report states:

> 'The Commission's central finding, subject to the recommendations made in [the] report, is that Crossrail 2 should be taken forward as a priority. Funding should be made available now (March 2016) to develop the scheme fully with the aim of

submitting a hybrid bill by autumn 2019. This would enable Crossrail 2 to open in 2033' (NIC, 2016: 4).

Further to the above, the Commission recommended the project be viewed as an investment of national significance due to its spatial implications beyond greater London, and its role in relieving congested rail terminal and interchange stations. Such a classification would allow the project to circumvent local planning systems through the NSIP regime (Hall, 2015). A summary of the commission's recommendations is included in Table 8, a comprehensive version of the recommendations is included in appendix E (NIC, 2016: 10, 12, 13).

Table 8: A summary of NIC recommendations from Transport for a World City

No.	NIC recommendation	Govt. response
1	Take forward Crossrail 2 as a priority with the aim of opening in 2033	Accepted
2	Place Crossrail 2 at the heart of the New London Plan	Accepted
3	Provide funding for the development of a revised business case to enable a hybrid bill to be submitted by autumn 2019.	Accepted (if TfL match it)
4	Identify further opportunities to maximise benefits and deliverability of Crossrail 2.	Accepted
5	Agree a 'London Deal for Crossrail 2' that stipulates the city cover 50% of costs	Accepted
6	Identify clear plans for delivering 200,000 homes as part of the project	Accepted
7	Identify opportunities to maximise private sector opportunities in funding stations and surrounds	Accepted
8	Aim to submit a hybrid bill to parliament by 2019 to ensure achievability of the 2033 open date	Accepted

The next stage of Crossrail 2 was given the green light with £80 million committed to help fund development. Yet, several hurdles remain. As noted by participant A:

> "There is absolutely no way that London can raise that money as a government institution… so, are HMT willing to say there is sufficient value in the project to rely upon the general taxpayer?"

This is unlikely given the project is adopting the same funding model as Crossrail 1, which is yet to be proven. Moreover, in contrast with other sectors, private sector involvement in the finance of transport projects is minimal as shown by Figure 10. Another problem is the delivery of homes, which, technically do not fall within the NIC's remit. Participant E feels:

> "The lack of major infrastructure projects and housing is the biggest disconnect currently in the planning system… the success stories all have an integrated masterplan with housing".

A deep dive into the NIC report raises a number of questions about Crossrail 2's ability to capture the commission's core objectives.

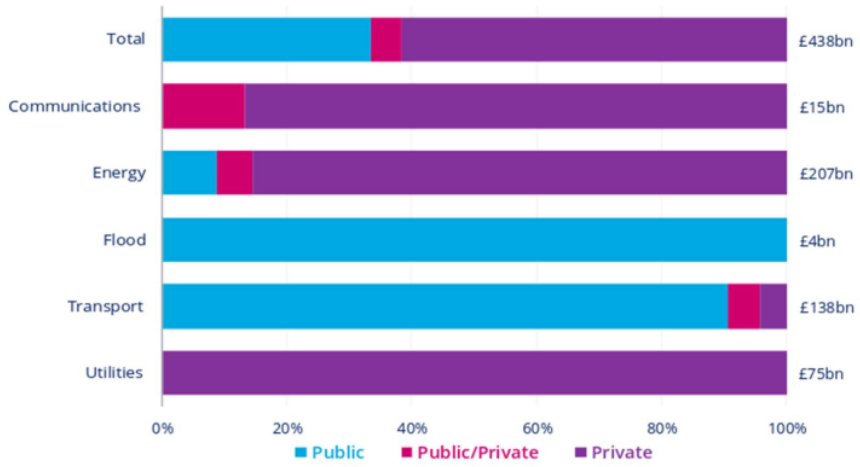

Figure 10: Apportionment of finance models employed for infrastructure projects in the UK

(Source: Institute for Government, 2019)

6.2 Crossrail 2 and NIC core objectives

To evaluate the performance of *Transport for a World City* in capturing NIC core objectives, several tools were employed. (1) Content analysis was completed using NVivo; (2) the resonance of key themes and best practice strategies from both HMT and UNDP evaluation guidance were tested. (3) The Sabatier and Mazmanian, (1980) policy evaluation framework was applied; and (4) informants were asked to describe how objectives were captured in the commissions work on transport, specifically, through Crossrail 2.

An initial deep dive into the report exposed a lack of explicit links between the project and NIC objectives. NVivo analysis showed that only two references were made to quality of life, one to competitiveness and none to sustainable economic growth. In lieu of clear definitions for objectives, distinct links are essential to ensuring reports are accessible to all. To identify links, the NIC performance measures framework was overlayed on Crossrail 2. As the commission's measures are intended to focus on infrastructure systems rather than individual projects, this idea was not feasible. For measuring performance at the project, or asset, level they refer to the IPA's *Transforming infrastructure performance* policy paper (NIC, 2018). This too is a work in progress, however, a thematic comparison of the framework documents highlighted some fundamental differences and raise questions around the compatibility of the frameworks. The priorities being pushed by the NIC and IPA are misaligned. This is demonstrated by the word clouds in figures 11 and 12. Key themes in the NIC framework include quality, the environment (natural, water, emissions), resilience and stakeholders. Conversely, key themes from the IPA include investment, procurement, delivery, products and cost. Should the IPA be responsible for the delivery of NIC recommended projects under the current model, there are risks original vision and objectives may be lost.

Figure 11: The NIC performance measures word cloud

Figure 12: The IPA performance measure word cloud

The IPA's example objectives and measures exemplify the conventional approach the commission intends to tackle as illustrated by Figure 13.

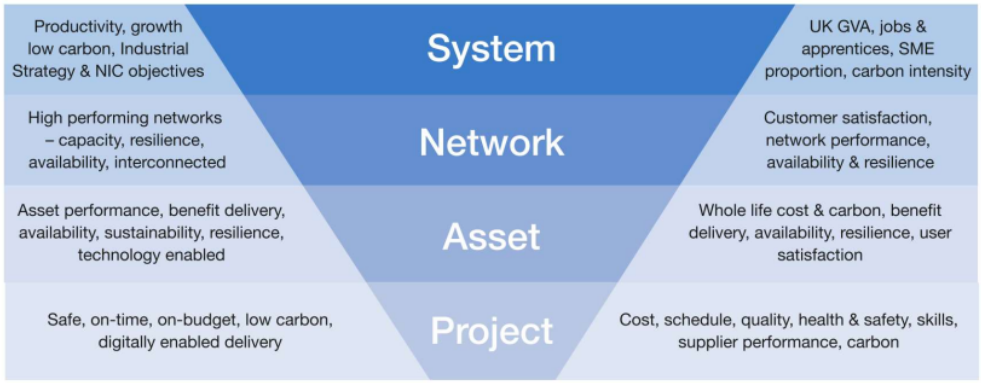

Figure 13: IPA example objectives and measures

(Source: Infrastructure and Projects Authority, 2017b)

Consistent with the above, the IPA is still very much concerned with iron triangle principles of cost, time and scope despite the NIC suggesting a need to move away from these outmoded measures. The partial nature of both NIC and IPA performance metrics shows an inability by both bodies to adhere to HMT and UNDP guidance. Though monitoring has been completed by the NIC in the form of their annual monitoring report, there is a lack of granularity in results frameworks to enable a reliable evaluation of progress. As noted by participant C:

> "Green Book asks that planners think about how you're going to evaluate projects at the start, so you have the system setup by the time you get to the end, rather than just building the damn thing and hoping that you can find a way of evaluating starting with the baseline. We're totally supportive of that, but we would see that responsibility sitting with the department".

The argument here is that the NIC take a systemic view when evaluating to assess whether the overall performance of infrastructure networks is improving or not. However, should it improve, there is not a clear process for isolating the origins of improvements to inform future decision-making. This problem is made more complex by the misalignment of performance frameworks between public bodies, which stem from conflicting priorities. The tractability of the problem is clear, and policy directives are unambiguous, however, the media rhetoric surrounding the problem and a lack of public support on the back of Crossrail 1 is concerning. This is demonstrated by the summary of Financial Times coverage included in Appendix F. In lieu of

strong public support, to avoid Sabatier and Mazmanian's (1980) gradual erosion scenario the retention of original staff is critical. Yet, as noted by participant D:

> "I'm one of the few people that worked on the first reports that is still in the organisation".

This suggests that NIC policies on Crossrail 2 are likely to experience the gradual erosion scenario unless the public discourse shifts. It also raises questions about maintaining institutional knowledge to enable original objectives to be carried forward. The commission are addressing this by establishing "recommendation owners'" to hold the government to account, but this will be redundant unless; (1) the underlying logic for infrastructure performance frameworks must be made consistent and the frameworks completed; and (2) a NIS with clear delivery plans that engage with NIA recommendations is completed.

7. Summary of findings

The analysis has unearthed several barriers to assessing the performance of the NIC against core objectives to date:

1. There must be clear definitions of core objectives with intelligible links to performance metrics;
2. Interdependent bodies need to be aligned with shared purpose and objectives;
3. Performance measures frameworks must be modified to ensure compatibility and be completed;
4. The NIS needs to published (ideally in accordance with Armitt's (2019) letter); and
5. Recommendations need to be given time to breathe.

Until these items are addressed, the performance of the commission in supporting sustainable economic growth, improving quality of life and improving competitiveness cannot be reliably assessed. This is supported by individual and collective interview narratives. By coding interview transcripts, several problematic themes emerged surrounding the NIC's insulation from politics. Table 9 shows the relative frequency of each node under the politics code.

Table 9: Frequency of politics nodes in interview transcripts

Political node	*Frequency*
Volatility & interference	39%
Uncertainty	33%
Apprehension & indecision	18%
Short-termism	5%
Transparency	5%

Political volatility and interference were the most frequently occurring node throughout the interviews with 24 direct references. Linked closely to uncertainty, apprehension and indecision, this concern was explained by participant B:

> "Yes, you can take the recommendations out, but final decisions still rest with the departments… I feel that's where we're vulnerable".

Throughout the interviews, it became apparent that the commissions first five years were primarily about building support by establishing credibility and constructing the bodies foundations. Participant F explained:

> "the first [NIA] was put together with the tools available to us. Now that we understand what the important questions are, the second will be built with tools created by us that engage with these questions".

Other pertinent points derived through coding were aspirational advice, a lack of a sense of permanence due to the EA status and solutions-based problems. It was clear advice should be more ambitious, however, th commissions strategy recognises the slow nature of this process as demonstrated by participant C:

> "we recognize that the political view is X. We want to make recommendations that are as likely to be accepted as possible. In some cases, we may make recommendations that are consistent with X. In other cases, we may try and frame our recommendations in such a way that builds the case for shifting away from X and that might not be jumping from X over there to Y over here… the commission is gradually trying to expand the set of things that are poetically achievable."

The long-term horizon of the commission will hopefully allow for the range of ideas tolerated in public discourse to be widened by extending the boundaries of the Overton window as shown in Figure 14.

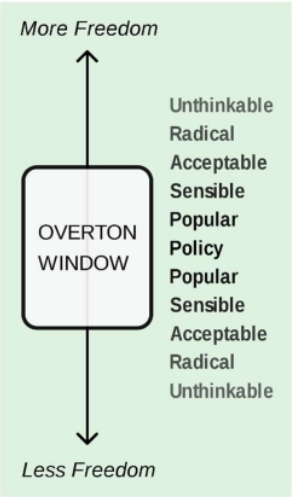

Figure 14: The Overton window, or, window of discourse

(Source: Lehman, 2019)

The Independent Statutory Body question should be revisited even if only to create a symbolic sense of permanence as many of the political challenges will likely remain. Lastly the commission should ensure that solutions are clearly rooted in problems, rather than solutions creating problems. Articulating the origins of the NIC's core objectives would be a helpful first step in starting this trend. It is apparent that there are several constraints currently hindering the NIC's ability to deliver its core objectives and reach its full potential. In the coming months the commission will face its biggest test yet in the NIS, a process plagued by uncertainty and almost entirely out of their control.

2. Make the commission an ISB to, if nothing else, give it the symbolic sense of permanence it deserves;
3. Add housing to the NIC's remit so it can be integrated into future work;
4. Establish overarching principles and metrics for infrastructure performance to ensure broad alignment across bodies like the NIC and IPA; and
5. Re-establish the IPC and take decisions back from Ministers to help insulate major infrastructure from political interference;

8.1 Reflections

Reflecting on challenges, the structure of this dissertation produced a linear narrative, which allows for preliminary findings to be verified as more information becomes available. This was useful for structuring my thoughts in a concise and understandable way. However, this order is a thin veil for the considerable challenges encountered in gathering data. Though I was able to leverage my academic and professional network to secure most planned interviews, accessing certain reports and policy documents that fed into the work of the commission was challenging and restricted aspects of the research.

Due to project constraints, the public were excluded from this dissertation. Given more time and space, I would have liked to integrate the community perspective and would encourage others to do so in future.

9. References

Allport, R. (2011) *Planning Major Projects*, *Construction Management and Economics*. Thomas Telford. doi: 10.1080/01446193.2012.674210.

Armitt, J. S. (2019) *Letter to Chancellor on the National Infrastructure Strategy*. Available at: https://www.nic.org.uk/wp-content/uploads/Sir-John-Armitt-to-Chancellor-of-the-Exchequer-10.05.19.pdf (Accessed: 1 September 2019).

Ashwell, E. (2019) *Interview | Crossrail 2 managing director Michèle Dix on project's fifth business case - New Civil Engineer*, *New Civil Engineer*. Available at: https://www.newcivilengineer.com/latest/interview-crossrail-2-managing-director-michele-dix-projects-fifth-business-case-18-07-2019/ (Accessed: 30 August 2019).

Atkins, G. *et al.* (2017) *What's wrong with infrastructure decision making? Conclusions from six UK case studies*. Available at: www.instituteforgovernment.org.uk/ (Accessed: 29 August 2019).

Atkinson, R. and Flint, J. (2001) 'Accessing Hidden and Hard-to-Reach Populations: Snowball Research Strategies', *Social Research Update*, (33).

Barber, S. (2017) 'Federal election results 1901-2016', *Parliamentary Library*. Available at: https://parlinfo.aph.gov.au/parlInfo/download/library/prspub/5188012/upload_binary/5188012.pdf (Accessed: 18 December 2018).

BBC News (2017) *UK election 2017: Conservatives lose majority - BBC News*. Available at: https://www.bbc.com/news/election-2017-40209282 (Accessed: 27 August 2019).

Bevir, M. and Rhodes, R. A. W. (2003) *INTERPRETING BRITISH GOVERNANCE*. Available at: https://cloudfront.escholarship.org/dist/prd/content/qt0zw8f6gp/qt0zw8f6gp.pdf (Accessed: 17 June 2019).

Bowker, G. C. *et al.* (2009) 'Toward Information Infrastructure Studies: Ways of Knowing in a Networked Environment', in *International Handbook of Internet Research*. Dordrecht: Springer Netherlands, pp. 97–117. doi: 10.1007/978-1-4020-9789-8_5.

Boyne, G. A. (2003) 'Sources of Public Service Improvement: A Critical Review and Research Agenda', *Journal of Public Administration Research and Theory*. Narnia, 13(3), pp. 367–394. doi: 10.1093/jpart/mug027.

Brenner, N. and Theodore, N. (2002) *Spaces of Neoliberalism: Urban Restructuring in North America and Western Europe*. Edited by N. Brenner and N. Theodore. Chichester, UK: John Wiley

& Sons, Ltd. doi: 10.1002/9781444397499.

Buitenhuis, A. J. (2013) *Public-Private Partnerships and Prison Expansion in Ontario: Shifts in Governance 1995 to 2012*. Available at: https://tspace.library.utoronto.ca/bitstream/1807/42694/6/Buitenhuis_Amy_J_201311_MA_thesis.pdf (Accessed: 9 August 2019).

Burchell, G., Gordon, C. and Miller, P. (1991) *The Foucault effect: Studies in governmentality*. Available at: https://pdfs.semanticscholar.org/abd3/b3d91f32d4fe85c851ef0b2f748b9934498d.pdf (Accessed: 23 August 2019).

Cabinet Office (2011) *Prime Minister's mandate for the Major Projects Authority*. Available at: https://www.gov.uk/government/publications/major-projects-authority-mandate (Accessed: 15 July 2019).

Cabinet Office (2018) *Executive Agencies: A guide for departmentsExecutive Agencies: A Guide for Departments*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/690636/Executive_Agencies_Guidance.PDF (Accessed: 10 July 2019).

Campbell, J. L., Hollingsworth, J. R. (Joseph R. and Lindberg, L. N. (1991) *Governance of the American economy*. Cambridge University Press.

Carmona, M., De Magalhães, C. and Natarajan, L. (2017) 'Design governance the CABE way, its effectiveness and legitimacy', *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, pp. 1754–9183. doi: 10.1080/17549175.2017.1341425.

Crossrail 2 (2019a) *Crossrail 2 in numbers - Crossrail 2*. Available at: https://crossrail2.co.uk/discover/in-numbers/ (Accessed: 30 August 2019).

Crossrail 2 (2019b) *Funding - Crossrail 2*. Available at: https://crossrail2.co.uk/discover/funding/ (Accessed: 31 August 2019).

Crossrail 2 (no date a) *History - Crossrail 2*. Available at: https://crossrail2.co.uk/discover/history/ (Accessed: 3 July 2019).

Crossrail 2 (no date b) *Next steps - Crossrail 2*. Available at: https://crossrail2.co.uk/next-steps/ (Accessed: 3 July 2019).

DCLG (2008) *Planning Act 2008: Guidance for the examination of applications for development consent for nationally significant infrastructure projects - Consultation*. Available at:

www.communities.gov.uk (Accessed: 22 July 2019).

Dimitriou, H. T., Ward, E. J. and Wright, P. G. (2013) 'Mega transport projects-Beyond the "iron triangle": Findings from the OMEGA research programme', *Progress in Planning*. Elsevier Ltd, 86, pp. 1–43. doi: 10.1016/j.progress.2013.03.001.

Dimtriou, H., Wright, P. and Ward, E. J. (2011) *Mega projects and mega risks: lessons for decision-makers through a comparative analysis of selected large-scale transport infrastructure projects in Europe, USA and Asia Pacific. Volume 5, Omega Research Programme UK and international case studies: comparisons, findings and lessons.* Available at: https://ucl-new-primo.hosted.exlibrisgroup.com/primo-explore/fulldisplay?docid=UCL_LMS_DS21170572320004761&context=L&vid=UCL_VU2&lang=en_US&search_scope=CSCOP_UCL&adaptor=Local Search Engine&tab=local&query=any,contains,lessons for decision-makers (Accessed: 19 December 2018).

DLA Piper (2018) 'UK INFRASTRUCTURE', (July).

Energy in Demand (2019) *Analysing Britain's Energy Performance Certificates | Energy in Demand - Sustainable Energy - Rod Janssen*. Available at: https://energyindemand.com/2019/05/04/analysing-britains-energy-performance-certificates/ (Accessed: 29 August 2019).

Flyvbjerg, B., Bruzelius, N. and Rothengatter, W. (2003) *Megaprojects and Risk*. Cambridge: Cambridge University Press. doi: 10.1017/CBO9781107050891.

Ford, J. and Plimmer, G. (2018) *Crossrail: how Europe's largest transport project stalled | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/0d020876-ffc4-11e8-aebf-99e208d3e521 (Accessed: 3 July 2019).

Glover, J. (2017) *Infrastructure spending is not the cure for all economic ills | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/fcfe1ec0-88ae-11e7-afd2-74b8ecd34d3b (Accessed: 3 July 2019).

Golzari-Munro, S. (2016) *NATIONAL INFRASTRUCTURE COMMISSION SECURING SUCCESS SERIES A GOVERNANCE MODEL FIT FOR THE FUTURE*. Available at: https://www.e3g.org/docs/National_Infrastructure_Commission_securing_success_series_-_A_governance_model_fit_for_the_future.pdf (Accessed: 20 June 2019).

GOV.UK (2012a) *1. Introduction - National Planning Policy Framework - Guidance - GOV.UK*. Available at: https://www.gov.uk/guidance/national-planning-policy-framework/1-

introduction (Accessed: 20 June 2019).

GOV.UK (2012b) *Infrastructure Planning Commission has closed*. Available at: https://www.gov.uk/government/organisations/infrastructure-planning-commission (Accessed: 19 July 2019).

GOV.UK (2015a) *Chancellor announces major plan to get Britain building - GOV.UK*. Available at: https://www.gov.uk/government/news/chancellor-announces-major-plan-to-get-britain-building (Accessed: 20 June 2019).

GOV.UK (2015b) *Department for Transport's settlement at the Spending Review 2015 - GOV.UK*, *GOV.UK*. Available at: https://www.gov.uk/government/news/department-for-transports-settlement-at-the-spending-review-2015 (Accessed: 20 June 2019).

GOV.UK (2015c) *Infrastructure at heart of Spending Review as Chancellor launches National Infrastructure Commission - GOV.UK*. Available at: https://www.gov.uk/government/news/infrastructure-at-heart-of-spending-review-as-chancellor-launches-national-infrastructure-commission (Accessed: 20 June 2019).

GOV.UK (2016a) *Charter for the National Infrastructure Commission - GOV.UK*. Available at: https://www.gov.uk/government/publications/charter-for-the-national-infrastructure-commission (Accessed: 20 June 2019).

GOV.UK (2016b) *Consultation on National Infrastructure Commission launched - GOV.UK*. Available at: https://www.gov.uk/government/news/consultation-on-national-infrastructure-commission-launched (Accessed: 20 June 2019).

GOV.UK (2016c) *National Infrastructure Commission : response to the consultation*. HM Government.

GOV.UK (2016d) *National Infrastructure Commission on the government's plans to place NIC on a statutory footing - GOV.UK*. Available at: https://www.gov.uk/government/news/national-infrastructure-commission-on-the-governments-plans-to-place-nic-on-a-statutory-footing (Accessed: 20 June 2019).

GOV.UK (2016e) *Smart power: A National Infrastructure Commission Report - GOV.UK*. Available at: https://www.gov.uk/government/publications/smart-power-a-national-infrastructure-commission-report (Accessed: 20 June 2019).

GOV.UK (2016f) *Transport for a world city: government response to the National Infrastructure Commission's report - GOV.UK*. Available at: https://www.gov.uk/government/publications/transport-for-a-world-city-government-

response-to-the-national-infrastructure-commissions-report (Accessed: 20 June 2019).

GOV.UK (2017) *Boost to National Infrastructure Commission's expertise - GOV.UK*. Available at: https://www.gov.uk/government/news/boost-to-national-infrastructure-commissions-expertise (Accessed: 20 June 2019).

GOV.UK (2018a) *Government's interim response to the National Infrastructure Assessment - GOV.UK*. Available at: https://www.gov.uk/government/publications/governments-interim-response-to-the-national-infrastructure-assessment (Accessed: 20 June 2019).

GOV.UK (2018b) *National Infrastructure Commission welcomes Sir John Armitt as new Chair - GOV.UK*. Available at: https://www.gov.uk/government/news/national-infrastructure-commission-welcomes-sir-john-armitt-as-new-chair (Accessed: 25 June 2019).

GOV.UK (no date) *About us - Planning Inspectorate*. Available at: https://www.gov.uk/government/organisations/planning-inspectorate/about (Accessed: 19 July 2019).

Hall, S. (2015) *Between state and market: A brief history of urban regeneration in England*. Available at: http://eprints.uwe.ac.uk/26379/3/Between state and market revised SH.pdf (Accessed: 11 April 2019).

Her Majesty's Government (2011) *Fixed-term Parliaments Act 2011*. Available at: http://www.legislation.gov.uk/ukpga/2011/14/pdfs/ukpga_20110014_en.pdf (Accessed: 3 July 2019).

HM Government (2016a) 'Charter for the National Infrastructure Commission'.

HM Government (2016b) *Government response to Transport for a World City*. Available at: http://crossrail2.co.uk/wp-content/uploads/2016/10/gov_response_transport_for_a_world_city.pdf (Accessed: 4 July 2019).

HM Treasury (2006) *The Eddington Transport Study*. Available at: www.dft.gov.uk (Accessed: 22 July 2019).

HM Treasury (2011) *The Magenta Book: Guidance for evaluation*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/220542/magenta_book_combined.pdf (Accessed: 12 June 2019).

HM Treasury (2015) *National Infrastructure Commission: terms of reference - GOV.UK*. Available at: https://www.gov.uk/government/publications/national-infrastructure-commission-terms-

Governance', *Review of International Political Economy*. Taylor & Francis, Ltd., pp. 561–581. doi: 10.2307/4177239.

Jessop, B. (1999) 'The Changing Governance of Welfare: Recent Trends in its Primary Functions, Scale, and Modes of Coordination', *Social Policy and Administration*. John Wiley & Sons, Ltd (10.1111), 33(4), pp. 348–359. doi: 10.1111/1467-9515.00157.

Jorgensen, T. (1993) 'Modes of governance and administrative change'. Available at: https://scholar.google.co.uk/scholar?hl=en&as_sdt=0%2C5&q=jorgensen+1993+governance&btnG= (Accessed: 18 June 2019).

Kanemoto, Y. (2013) 'Pitfalls in estimating "wider economic benefits" of transportation projects', *GRIPS Discussion Papers*. National Graduate Institute for Policy Studies. Available at: https://ideas.repec.org/p/ngi/dpaper/13-20.html (Accessed: 31 August 2019).

Kvale, S. (2007) *Doing Interviews*. 1 Oliver's Yard, 55 City Road, London England EC1Y 1SP United Kingdom: SAGE Publications, Ltd. doi: 10.4135/9781849208963.

Labour's Policy Review (2013) *The Armitt Review An independent review of long term infrastructure planning commissioned for Labour' s Policy Review*. Available at: https://www.policyforum.labour.org.uk/uploads/editor/files/The_Armitt_Review_Final_Report.pdf (Accessed: 20 June 2019).

Larner, W. (2000) 'Neo-liberalism: Policy, Ideology, Governmentality, Studies in Political Economy'. Wendy Larner, 63(1), pp. 5–25. doi: 10.1080/19187033.2000.11675231.

Lawford, M. (2019) *Chelsea's property market slows down | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/96a4fbd6-730c-11e9-bf5c-6eeb837566c5 (Accessed: 3 July 2019).

Lehman, J. (2019) *An Introduction to the Overton Window of Political Possibility – 101 Recommendations to Revitalize ... – Mackinac Center*. Available at: https://www.mackinac.org/12481 (Accessed: 31 August 2019).

Lovrić, M., Blainey, S. and Preston, J. (2017) 'A conceptual design for a national transport model with cross-sectoral interdependencies', *Transportation Research Procedia*. Elsevier, 27, pp. 720–727. doi: 10.1016/J.TRPRO.2017.12.150.

Mance, H. (2017) *Andrew Adonis quits as May infrastructure adviser | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/7ac22360-ecc8-11e7-bd17-521324c81e23 (Accessed: 1 April 2019).

March, J. G. and Olsen, J. P. (1989) *Rediscovering institutions : the organizational basis of politics*. The Free Press. Available at: https://ucl-new-primo.hosted.exlibrisgroup.com/primo-explore/fulldisplay?docid=UCL_LMS_DS21115714690004761&context=L&vid=UCL_VU2&lang=en_US&search_scope=CSCOP_UCL&adaptor=Local Search Engine&tab=local&query=any,contains,Rediscovering institutions: The organizational basis of politics&offset=0 (Accessed: 18 June 2019).

Marsh, D. and Rhodes, R. A. W. (1992) *Policy networks in British government*. Clarendon Press.

Marshall, T. (2011) 'Reforming the process for infrastructure planning in the UK/England 1990–2010', *Town Planning Review*, 82(4), pp. 441–467. doi: 10.3828/tpr.2011.26.

Marshall, T. (2012) *Planning Major Infrastructure*. Routledge. doi: 10.4324/9780203112120.

Mayor of London (2014) 'London Infrastructure Plan 2050'.

McKinsey Global Institute (2016) *Bridging Global Infrastructure Gaps*. Available at: www.mckinsey.com/mgi. (Accessed: 1 July 2019).

Menon, S., Karl, J. and Wignaraja, K. (2009) *Handbook on Planning, Monitoring and Evaluating for Development Results*. Available at: http://www.undp.org/eo/handbook (Accessed: 12 June 2019).

Mullings, B. (1999) 'Insider or outsider, both or neither: some dilemmas of interviewing in a cross-cultural setting', *Geoforum*, 30, pp. 337–350. Available at: www.elsevier.com/locate/geoforum (Accessed: 27 August 2019).

National Infrastructure Commission (2018a) *CONGESTION, CAPACITY, CARBON: PRIORITIES FOR NATIONAL INFRASTRUCTURE*. Available at: https://www.nic.org.uk/wp-content/uploads/Congestion-Capacity-Carbon_-Priorities-for-national-infrastructure.pdf (Accessed: 24 July 2019).

National Infrastructure Commission (2018b) *Technical annex: Measuring infrastructure performance*. Available at: https://www.nic.org.uk/wp-content/uploads/Technical-annex-Measuring-infrastructure-performance.pdf (Accessed: 24 July 2019).

NIC (2016) *Transport for a world city: A National Infrastructure Commission report - GOV.UK*. Available at: https://www.gov.uk/government/publications/transport-for-a-world-city-a-national-infrastructure-commission-report (Accessed: 20 June 2019).

NIC (2018) *Performance Measures Data*. Available at: https://www.nic.org.uk/publications/performance-measures-data/ (Accessed: 29 August

2019).

Odell, M. (2012a) *London urged to start work on Crossrail 2 | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/4572e4d4-a11e-11e1-9fbd-00144feabdc0 (Accessed: 3 July 2019).

Odell, M. (2012b) *Transport: Benefits may be intangible down track | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/2d8b526e-d7df-11e1-9980-00144feabdc0 (Accessed: 3 July 2019).

Odell, M. (2013a) *Second Crossrail line seen as vital for HS2 | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/74b74100-7223-11e2-89fb-00144feab49a (Accessed: 3 July 2019).

Odell, M. (2013b) *TfL considers options for 'Crossrail 2' | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/4c8872a0-6fab-11e2-8785-00144feab49a (Accessed: 3 July 2019).

OMEGA Centre (2011) *BARTLETT SCHOOL OF PLANNING MEGA PROJECTS AND MEGA RISKS: Lessons for Decision-makers through a Comparative Analysis of Selected Large-scale Transport Infrastructure Projects in Europe, USA and Asia Pacific VOLUME 6: OMEGA RESEARCH PROGRAMME FINAL REPORT APPENDICES Omega Centre Centre for Mega Projects in Transport and Development*. Available at: http://www.omegacentre.bartlett.ucl.ac.uk/open/OMEGA-2-Final-Report-Vol-6.pdf (Accessed: 22 June 2019).

Owens, S. (2015) 'Knowledge, Advice, and Policy', in *Knowledge, Policy, and Expertise*. Oxford University Press, pp. 1–22. doi: 10.1093/acprof:oso/9780198294658.003.0001.

Pfeifer, S. (2018) *Ministers urged to spend extra £43bn on transport links in cities | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/759ee568-98ac-11e8-9702-5946bae86e6d (Accessed: 3 July 2019).

Pickard, J. (2014) *Hopes fade for rapid start to London's Crossrail 2 | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/48b04894-b440-11e3-bac4-00144feabdc0 (Accessed: 3 July 2019).

Pickard, J. (2015) *Osborne tries to allay fears of infrastructure spending cuts | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/2ff087f8-7e63-11e5-98fb-5a6d4728f74e (Accessed: 3 July 2019).

Pickard, J. and Plimmer, G. (2017) *Transport for London warns Crossrail 2 could be delayed by decade | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/a1257c0a-

a4f2-11e7-b797-b61809486fe2 (Accessed: 3 July 2019).

Pickard, J. and Spero, J. (2018) *London's Crossrail 2 in doubt after financial woes grow | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/7b6e59de-fd5a-11e8-ac00-57a2a826423e (Accessed: 3 July 2019).

Pickford, J. (2013a) *Boris Johnson urges investment as he unveils vision for London | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/a2ec4bf2-d285-11e2-aac2-00144feab7de (Accessed: 3 July 2019).

Pickford, J. (2013b) *Johnson urges infrastructure drive | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/c279b2f6-66f7-11e2-a805-00144feab49a (Accessed: 3 July 2019).

Pickford, J. (2013c) *London project to use risky funding model | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/fcda4910-9f64-11e2-b4b6-00144feabdc0 (Accessed: 15 April 2019).

Pickford, J. (2013d) *Roads and railways earn top billing in UK investment programme | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/565f5de6-df51-11e2-a9f4-00144feab7de (Accessed: 3 July 2019).

Pickford, J. (2014) *Study offers funding boost to Crossrail 2 | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/1539f546-900f-11e3-aee9-00144feab7de (Accessed: 3 July 2019).

Pickford, J. and Parker, G. (2013) *London needs investment in transport and housing, says Adonis | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/2e3d63ac-6341-11e3-886f-00144feabdc0 (Accessed: 3 July 2019).

Plimmer, G. (2014) *Mayor calls for £1.3tn investment in London's infrastructure | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/e23b9728-17ed-11e4-b842-00144feabdc0 (Accessed: 3 July 2019).

Plimmer, G. (2016) *Funding for projects hard to come by, say experts | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/c9d19cce-eb6c-11e5-bb79-2303682345c8 (Accessed: 3 July 2019).

Plimmer, G. (2018) *London needs to fund £30bn Crossrail 2, business group says | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/3d7e8ab4-8f3b-11e8-bb8f-a6a2f7bca546 (Accessed: 3 July 2019).

Plimmer, G. and Bounds, A. (2017) *London's £30bn Crossrail 2 project moves a step forward | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/4cf8d248-705f-11e7-93ff-99f383b09ff9 (Accessed: 3 July 2019).

Plimmer, G. and Pickard, J. (2016) *Private sector called on to invest in most big projects | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/732cf74a-f0e6-11e5-aff5-19b4e253664a (Accessed: 3 July 2019).

Powley, T. (2015) *London's £27bn Crossrail 2 plans advance | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/a8eee350-7cb2-11e5-a1fe-567b37f80b64 (Accessed: 3 July 2019).

Rhodes, R. (1997) *Understanding Governance*.

Roamef (no date) *ROAMEF Cycle - roamef*. Available at: http://www.roamef.com/what-we-do/roamef-cycle (Accessed: 12 August 2019).

Rose-Redwood, R. S. (2006) 'Governmentality, Geography, and the Geo-Coded World', *Progress in Human Geography*. Sage PublicationsSage CA: Thousand Oaks, CA, 30(4), pp. 469–486. doi: 10.1191/0309132506ph619oa.

Royal Academy of Engineering (2013) *GB electricity capacity margin*. Available at: www.raeng.org.uk (Accessed: 31 August 2019).

Sabatier, P. and Mazmanian, D. (1980) 'The implementation of public policy: a framework of analysis', *Policy Studies Journal*, 8(4), pp. 538–560. Available at: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1541-0072.1980.tb01266.x (Accessed: 26 August 2019).

Santos, G. and Rojey, L. (2004) 'Distributional impacts of road pricing: The truth behind the myth', *Transportation*, 31(1), pp. 21–42. doi: 10.1023/B:PORT.0000007234.98158.6b.

Snowy Mountain Engineering Company (2001) *The Management of Mega Projects in International Development*. Cooma, New South Whales.

Spero, J. (2018) *Sadiq Khan hits out at government over Crossrail project | Financial Times*, *Financial Times*. Available at: https://www.ft.com/content/b82755a0-fd4c-11e8-ac00-57a2a826423e (Accessed: 3 July 2019).

Stuart MP, G. (2018) 'UK infrastructure a "wealth of opportunity" - GOV.UK', in. Available at: https://www.gov.uk/government/speeches/uk-infrastructure-a-wealth-of-opportunity (Accessed: 28 June 2019).

World Economic Forum (2018) *The Global Competitiveness Report 2018*. Available at: http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf (Accessed: 28 August 2019).

10. Appendix

Appendix A: Semi-structured interviews questionnaire

In answering the following questions please, wherever possible, relate your responses to your personal experience in practice (Snowden & Flyvbjerg).

1. Briefly outline the nature of your professional relationship with the NIC.
2. Please describe, in your own words, the role of the NIC.

Evaluating the performance of the commission to date (academic link: van Thiel and Leeuw, 2002):

3. To what extent has the NIC supported sustainable economic growth across all regions of the UK?
4. To what extent has the NIC improved competitiveness?
5. To what extent has the NIC improved quality of life?
6. Please describe how the above three core objectives (repeat) have been captured through your work on transport infrastructure?
    a. **Probes**: Transport for a World City - Crossrail 2 should be taken forward as a priority and be the heart of the new London Plan.
    b. London to cover more than half the costs of the scheme and include substantial measures to realise full housing benefits (200,000)
    c. Maximise private sector involvement opportunities in the development and funding of stations and their surrounding areas.
7. Please describe how the above three core objectives (repeat) have been captured through your work on energy.
    a. **Probes:** Smart Power - Interconnection: connecting our network to our European neighbours.
    b. Storage: Allowing users to take energy from the grid to be used when it is needed.
    c. Flexible demand: Allowing consumers to choose how and when they use power to cut costs and emissions without inconvenience.
8. What evaluation and audit procedures has the commission put in place and how rigorous are these?

9. Following the publication of the first National Infrastructure Assessment, NIC Chief Executive, Philip Graham, said in a 2018 blog post: 'The recommendations of the NIA provide a strong platform to foster economic prosperity, to improve competitiveness and improve quality of life. But that will only happen if government accepts those recommendations and takes action. A platform is only as good as the structures that are built on it'. Please discuss what you think he meant by this. (academic link: OMEGA Centre, 2011).
    a. **Probes:** institutional strength
    b. what, if anything, needs to change and by who?
10. The consultation on NIC governance came out in support of the commission being placed on an independent statutory footing, yet, it is an Executive Agency to HM Treasury. Please discuss the impact this has had on the commission's work both current and future. (academic link: Owens, 2015; Golzari-Munro, 2016; Carmona, De Magalhães and Natarajan, 2017)
    a. **Probes:** Insulated from political interference / volatility (academic link: Flyvbjerg, Bruzelius and Rothengatter, 2003; Allport, 2012)
    b. Is the advice ambitious or massaged - does the commission pander to the Government by giving them the advice that they want, rather than what they need?
11. Is there a mega trend emerging in this space or is there something that we're not currently thinking about that we ought to be?
12. Lastly, is there anything that we have not discussed that you think is important?

Appendix B: NIC development timeline

03/27/2012 The NIC is mentioned for the first time in the National Planning Policy Framework (NPPF) (GOV.UK, 2012a).

03/04/2013 The Armitt Review is published and proposes the establishment of the NIC as it's 'central recommendation'. The proposals seek to address the issues at the "front-end" of the investment cycle highlighted as problematical by the "Call for Evidence" (Labour's Policy Review, 2013: 18).

10/05/2015 Conservative, George Osbourne announces major plan to 'get Britain building'. The NIC is the fourth and final recommendation (GOV.UK, 2015c).

10/30/2015 Osbourne commits $100 Billion in infrastructure spending by 2020. Infrastructure at the heart of this spending review. In his letter to Lord Adonis, Osbourne (2015: 1) made clear his intent to consult to put the Commission on a 'statutory footing and confirm its independence' (The Rt Hon George Osbourne, 2015).

10/30/2015 NIC ToR published (HM Treasury, 2015). Initial projects:

1. Future investment in North's transport infrastructure
2. London's transport infrastructure
3. Delivering future-proof energy infrastructure "

11/11/2015 Infrastructure UK and the Major Projects Authority merge to create the Infrastructure and Projects Authority, which is responsible for the management and delivery of all major projects for the UK economy (GOV.UK, 2015a).

11/25/2015 DfT settlement on the spending review includes $46.7 Billion for transport (GOV.UK, 2015b).

01/07/2016 Consultation on NIC governance structure and operation launched. The statutory footing was reaffirmed by HM Treasury following the consultation in May 2016 when they stated 'the government intends to introduce legislation to place the commission on a permanent, independent footing as soon as parliamentary time allows' (GOV.UK, 2016: 7).

03/04/2016 NIC report #1 on Smart Power published (GOV.UK, 2016e).

03/10/2016 NIC report #2 on Transport for a World City published (GOV.UK, 2016f).

Various other reports published over this period.

04/13/2016 Government responds to first batch of reports and adopts key recommendations (GOV.UK, 2016f).

05/18/2016 NIC provides response to the consultation on governance (GOV.UK, 2016c).

05/18/2016 Government announces that it will create a new statutory basis for the independence of the NIC through the 2016 Queens Speech (GOV.UK, 2016d).

05/19/2016 Government underlines commitment to put the NIC on a statutory footing following consultation via primary legislation (GOV.UK, 2016d).

10/12/2016 NIC Charter published (GOV.UK, 2016a). The charter identifies the NIC as an executive agency of HM Treasury, not an ISB as previously planned. This contradicts consultation advice.

10/12/2016 Conservative, Phillip Hammond formally announces the decision to place the commission on executive agency footing. Sir John Armitt is named interim Deputy Chair (GOV.UK, 2017).

01/24/2017 NIC Framework document is published (HM Treasury, 2017).

04/21/2017 Lord Adonis named permanent chair and 4 new commissioners appointed (GOV.UK, 2017).

12/29/2017 Lord Adonis resigns over Brexit and East Coast Rail Franchise decision (Mance, 2017)

01/18/2018 Armitt becomes new Chair (GOV.UK, 2018b).

07/05/2018 First National Infrastructure Assessment published (NIC, 2018).

10/29/2018 Government issues interim response to the NIA and promises a comprehensive response in 2019 (GOV.UK, 2018a).

07/05/2019 Comprehensive response should be published in accordance with the NIC Charter (i.e. full response in typically six months but in any case, no longer than a year). This will be in the form of a National Infrastructure Strategy and will be the first such document in the UK (HM Government, 2016a).

Appendix C: NIC performance measures matrix

Domain	Sub-domain	Transport	Energy	Waste	Water and wastewater	Flood risk	Digital comms
Volume	Volume of consumption	Passenger/tonne km travelled (e)	Energy consumed (e)	Total waste generated (e)	Water consumed (e)	N/A	GB of data consumed (fixed and mobile) (e)
				Residual waste generated (e)	Wastewater produced (n)		Voice minutes (fixed and mobile) (e)
		Number of trips (e)					4G subscriptions (e)
							Full fibre subscriptions (e)
Resilience	Resilience to large shocks	Stress test (n)	Stress test (n)	Stress test (n)	Security of supply index (e)	Risk of flooding and coastal erosion (e)	Stress test (n)
			Capacity margin (e)			Standard of protection (n)	
			Expected loss of load (e)		Probability of drought (n)		
	Everyday resilience	Travel time reliability (n)	Time that properties lose access to energy (e)	N/A	Time that properties lose access to water (e)	Number of properties flooded (n)	Number of serious incidents reported to Ofcom (e)
					Number of sewer flood events (e)		
Quality	Service quality	Connectivity (n)	N/A	GVA from waste material recovery (e)	Number of water quality incidents (e)	N/A	Coverage by technology (e)
				Recycling rates (e)			Actual speed at peak time (n)
	Quality of user experience	Satisfaction derived from survey (e)	Satisfaction derived from survey (c)	Design quality (n)	Satisfaction derived from survey (e)	Design quality (n)	Satisfaction derived from survey (e)
		Design quality (n)	Design quality (n)		Design quality (n)		Design quality (n)
							Percentage of all 90-second calls completed without interruption (e)
							Percentage of mobile data connections which deliver a speed of at least 2 Mbps (e)
Cost	Cost		Cost per kWh of energy (c)	Cost per tonne of waste collected	Cost of water per litre (c)	Cost per property protected (c)	Cost per GB of data (fixed and mobile) (e)

		Cost per passenger/tonne km (c)	Average annual energy bill (e)	and disposed/treated (c)	Cost of wastewater treated per population equivalent (c) Average annual water and sewerage bill (e)	Cost incurred on flood risk insurance claims (e)	Average monthly bill (fixed and mobile) (e)
Environment	**Emissions**	CO_2e emissions per passenger/tonne km (e)(c)	CO_2e emissions per kWh used (c)	CO_2e emissions per tonne of waste produced (c)	CO_2e emissions per litre of water consumed (e)	N/A	CO_2e emissions per GB of traffic used (n)
		Total CO_2e emissions from transport (e)	Total CO_2e emissions from energy (e)	Total CO_2e emissions from waste (e)	Total CO_2e emission from water and wastewater (e)		Total CO_2e emissions from digital comms (n)
	Environmental externalities	Air quality (e) Noise (e)	Air quality (e)	Waste generated per capita (e) Ground pollution from waste (n)	Number of serious pollution incidents caused by water companies (e) Percentage of water bodies with unsustainable levels of abstraction (e) Average concentration of reactive phosphorus in rivers (e)	Measure of habitat improved or created (e)	N/A
	Natural capital	To be developed	Value of energy services provided by natural environment (e) Cost that energy services impose on the natural environment (e)	To be developed	Value of water services provided by natural environment (e)	To be developed	To be developed
Efficiency	**System efficiency**	Congestion (e)	Energy efficiency of buildings (e) Transmission/distribution losses (e) Ratio of average to peak demand (c)	Reject rates from sorting facilities (e) Capture rate of recyclable materials (e)	Leakage (e)	N/A	N/A

Appendix D: Crossrail 2 history and timeline

1944 The Greater London Plan introduced a west to north-east line through a world-first cross-London tunnel (Crossrail 2, 2019).

1970 A line was proposed to relieve pressure on other tube lines in South West London – a natural successor to the recently completed Victoria Line (The Royal Borough of Kensington and Chelsea, 2007).

1989 After 19 years on ice, the project was proposed again in the Central London Rail Study of 1989, however, the Jubilee Line was given precedence (ibid.).

1991 The Chelsea-Hackney proposal was safeguarded by strategic land acquisitions to prevent any conflicting developments compromising the line (ibid.).

1995 An alternative Express Metro plan was introduced to reduce the need for new track and stations by utilising National Rail standards (Crossrail 2, 2019).

2000 The London East-West Study appraised Crossrail, the Chelsea Hackney line and a hybrid of the two from Wimbledon to Tottenham Court Road and then on to Liverpool Street (ibid.).

2008 The Chelsea-Hackney line route was safeguarded to legally shield it from conflicting developments (ibid.).

Extensive 'optioneering' was conducted through an appraisal of over 100 route options (the long list) to ascertain the optimal solution, which best addressed transport and growth challenges. This resulted in two short-listed options: The regional option and the metro option (ibid.).

2013 Consultation on the short-listed options began. The regional option was designed to relieve congested sections of Norther, Piccadilly and Victoria lines while critically minimising capacity constraints across the National Rail Network and incoming Waterloo lines. The Metro Option, in contrast, relieved congestion on the central London tube network by introducing additional capacity. The regional option generated the greatest level of support from stakeholders (ibid.).

2014 Consultation on specific route options continued with all stakeholders (ibid.).

2015 The revised route was safeguarded and approved by the UK Government in 2015 (ibid.).

2015 Consultations on: station locations, entrances and exits; shaft locations for tunnelled sections; construction sites required to build and operate the tunnelled section of the scheme; service patters (ibid)

2016 The NIC publish Transport for a World City, recommending that Crossrail 2 should be taken forward as a priority. The Commission also recommended that funding should be made available immediately so a Hybrid Bill can be lodged in Parliament by Autumn 2019, to facilitate a 2033 finish (ibid).

2018 An independent funding and financing review began with additional design development, option testing and analysis (Crossrail 2, 2019 b)

2021 Submit Hybrid Bill to Parliament for the construction of Crossrail 2 (ibid.).

2022 **General election must be held before 8 June (HM Government, 2011).**

2030s Crossrail 2 is planned to be opened to the public in the first half of this decade (ibid.).

Appendix E: NIC recommendations from Transport for a World City

No.	NIC Recommendation
1	Crossrail 2 should be taken forward as a priority with the aim of opening in 2033, subject to the recommendations below (NIC, 2016: 10)
2	Crossrail 2 should be at the heart of the new London Plan, alongside existing commitments to upgrades and other pieces of new infrastructure. Crossrail 2 should not, subject to affordability, prevent the development of other high value schemes, particularly where alternative funding mechanisms are available (ibid,). • London must continue to plan strategically for the period 2030-2050 through the next iteration of the London Plan. Crossrail 2 should be at the heart of this strategy and TfL's wider programme of smaller scale interventions on the national rail, road, Underground and cycling networks in London should be integrated with it to complement and enhance its benefits (ibid,). • The London Plan should also include a detailed examination of the scope to deliver other strategic projects, such as further east London river crossings and the Bakerloo Line extension, through alternative financing mechanisms. This should build on the precedents from the Silvertown Crossing and Northern line extension to Battersea/Nine Elms (ibid,).
3	Sufficient development funds should be released for TfL and DfT to submit a revised business case for Crossrail 2 by March 2017 and aim to introduce a hybrid bill by autumn 2019. The revised business case should include developed plans on costs, funding, housing and stations. TfL estimate the overall development cost at c.£160 million, TfL should be expected to make a reasonable contribution to these costs (NIC, 2016: 12)
4	In developing the business case, it is crucial that TfL and DfT identify clear proposals to maximise its benefits and increase deliverability. The costs of Crossrail 2 are high and therefore every opportunity should be taken to improve its affordability (ibid.). • The updated case should include detailed options to reduce and phase the costs of the scheme. The most promising option identified to enhance affordability would be to delay the construction of the north-western branch to New Southgate. This could reduce the costs of the initial scheme in the 2020s by around £4 billion. More work should also be done on the costs and benefits of individual central London stations. • If construction of the north-western branch is delayed, this would also provide the opportunity to consider the case for an eastern branch from Hackney as an alternative.
5	A 'London deal for Crossrail 2' funding agreement, through which London bears more than half the costs of the scheme and which includes substantial measures to realise the full housing benefits, should be agreed ahead of hybrid bill submission (NIC, 2016: 13). • It is vital that a funding package for Crossrail 2 is developed which strikes a fair balance between the contributions made by London taxpayers and businesses and by central government. This should build on the work already undertaken by TfL, which indicated that around half the cost of the project could be funded from London sources.

	• As part of this the government should work with TfL and GLA to explore new funding options, which could include consideration of further devolution. However, even without such devolution, HM Treasury should be able to recoup significant receipts from the added Gross Value Added (GVA) benefits and the rising value of property. • A London deal for Crossrail 2 will need to cover both the funding of the project and the planning measures required to deliver Crossrail 2's benefits.
6	TfL and DfT in conjunction with other government departments and relevant bodies, should use the next stage of development to set out a clear, transformative plan to turn the proposed 200,000 homes into a reality (NIC, 2016; 13) • Strong measures to maximise the new housing enabled by the scheme should be included in the 'London deal for Crossrail 2'–this could include the establishment of one or more development corporations to lead the masterplanning and delivery of new housing and urban realm provision, and revised planning guidance for the whole route. These measures should be considered as a potential model for improving housing delivery more widely. • For housing provision to be a success across the whole route, the London deal for Crossrail 2 will need to have buy-in from the GLA and London boroughs along the route as well as counties and boroughs outside of London which benefit from the new line. All parties will need to ensure the housing unlocked by Crossrail 2 is sustainable and meets the needs of Londoners and those in commuter regions around London.
7	The opportunity should be taken to maximise the private sector involvement in the development and funding of stations and their surrounding areas. • TfL and DfT should leverage private sector capital and expertise to develop selected Crossrail 2 stations, including both the stations themselves and the surrounding land. The development could also be supplemented by land purchase powers and the ability to assemble sites.
8	Following the submission of a revised business case and agreement on the conditions above, the aim should be for a hybrid bill to be submitted by autumn 2019 – the first step towards the railway opening in 2033. • Submission of a bill in 2019 would allow significant progress to be made on the passage of a bill before the end of this parliament. • Completion of the project in 2033 would allow the project to open in time for the planned arrival of HS2 phase 2 at Euston.

Appendix F: Crossrail 2 media rhetoric in the Financial Times

12/05/12	London urged to start work on Crossrail 2 (Odell, 2012a).
19/08/12	Transport: Benefits may be intangible down track (Odell, 2012b).
25/01/13	Johnson urges infrastructure drive (Pickford, 2013b).
05/02/13	TfL considers options for Crossrail 2 (Odell, 2013b).
17/02/13	Second Crossrail line seen as vital for HS2 (Odell, 2013a).
08/08/13	London projects to use risky funding model (Pickford, 2013c).
11/06/13	Boris Johnson urges investment as he unveils vision for London (Pickford, 2013a).
27/06/13	Roads and railways earn top billing in UK investment program (Pickford, 2013d).
13/12/13	London needs investment in transport and housing, says Adonis (Pickford and Parker, 2013).
08/02/13	Study offers funding boost to Crossrail 2 (Pickford, 2014).
25/03/14	Hopes fade for rapid start to London's Crossrail 2 (Pickard, 2014).
30/07/14	Mayor calls for £1.3tn investment in London's infrastructure (Plimmer, 2014).
28/10/14	Boris Johnson fears for London economy without Crossrail 2 (Thompson, 2014a).
27/11/14	Revenue projects boost Crossrail 2 (Thompson, 2014b).
27/10/15	London's **£27bn** Crossrail 2 plans advance (Powley, 2015).
30/10/15	Osborne tries to allay fears of infrastructure spending cuts (Pickard, 2015).
01/02/16	Celebrities rail at station plan for Chelsea (Sullivan, 2016a).
15/03/16	Osborne pushes ahead with Crossrail 2 (Sullivan, 2016b).
16/03/16	Funding for projects hard to come by, say experts (Plimmer, 2016).
23/03/16	Private sector called on to invest in most big projects (Plimmer and Pickard, 2016).
24/07/17	London's **£30bn** Crossrail 2 project moves a step forward (Plimmer and Bounds, 2017).
24/08/17	Infrastructure spending is not the cure for all economic ills (Glover, 2017).
03/10/17	TfL warns Crossrail 2 could be delayed by a decade (Pickard and Plimmer, 2017).
30/07/18	London needs to fund £30bn Crossrail 2, business group says (Plimmer, 2018).
05/08/18	Ministers urged to spend extra £43bn on transport links in cities (Pfeifer, 2018).
11/12/18	Sadiq Khan hits out at government over Crossrail project (Spero, 2018).
11/12/18	London's Crossrail 2 in doubt after financial woes grow (Pickard and Spero, 2018).
21/12/18	Crossrail: How Europe's largest transport project stalled (Ford and Plimmer, 2018).
16/05/19	Chelsea's property market slows down (Lawford, 2019)

Appendix G: Consent form

CONSENT FORM FOR INFRASTRUCTURE EXPERTS IN RESEARCH STUDIES

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Study: The National Infrastructure Commission: Problems of governance, institutions and independence.
Department: The Bartlett School of Planning
Name and Contact Details of the Principal Researcher: Edward Aitken – ucbqeai@ucl.ac.uk - +447898734232

Thank you for considering taking part in this research. The person organising the research must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

I confirm that I understand that by ticking/initialling each box below I am consenting to this element of the study. I understand that it will be assumed that unticked/initialled boxes means that I DO NOT consent to that part of the study. I understand that by not giving consent for any one element that I may be deemed ineligible for the study.

		Tick Box
1.	I confirm that I have read and understood the Information Sheet for the above study. I have had an opportunity to consider the information and what will be expected of me. I have also had the opportunity to ask questions which have been answered to my satisfaction and would like to take part in (please tick one or more of the following) - an individual interview	
2.	I understand that I will be able to withdraw my data up to 4 weeks after the interview	
3.	I consent to participate in the study. I understand that my personal information *(provide information on what personal information specifically will be collected)* will be used for the purposes explained to me. I understand that according to data protection legislation, 'public task' will be the lawful basis for processing.	
4.	**Use of the information for this project only** I understand that all personal information will remain confidential and that all efforts will be made to ensure I cannot be identified (unless you state otherwise, because of the research design or except as required by law). I understand that my data gathered in this study will be stored anonymously and securely. It will not be possible to identify me in any publications. OR Anonymity is optional for this research. Please select from the following 3 options: (a) I agree for my real name and role/affiliation to be used in connection with any words I have said or information I have passed on. (b) I request that my comments are presented anonymously but give permission to connect my role/affiliation with my comments (but not the title of my position). (c) I request that my comments are presented anonymously with no mention of my role/affiliation.	
5.	I understand that my information may be subject to review by responsible individuals from the University (to include sponsors and funders) for monitoring and audit purposes.	
6.	I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason,	

	I understand that if I decide to withdraw, any personal data I have provided up to that point will be deleted unless I agree otherwise.	
7.	I understand the potential risks of participating and the support that will be available to me should I become distressed during the course of the research.	
8.	I understand the direct/indirect benefits of participating.	
9.	I understand that the data will not be made available to any commercial organisations but is solely the responsibility of the researcher(s) undertaking this study.	
10.	I understand that I will not benefit financially from this study or from any possible outcome it may result in in the future.	
11.	I agree that my [anonymised] [pseudonymised] research data may be used by others for future research. [No one will be able to identify you when this data is shared.]	
12.	I understand that the information I have submitted will be published as a report and I wish to receive a copy of it. Yes/No	
13.	I consent to my interview being audio recorded and understand that the recordings will be: EITHER - Destroyed within 3 months of the interview. To note: If you do not want your participation recorded you can still take part in the study.	
14.	I am aware of who I should contact if I wish to lodge a complaint.	
15.	I voluntarily agree to take part in this study.	
16.	Use of information for this project and beyond I understand that other authenticated researchers will have access to my data.	

If you would like your contact details to be retained so that you can be contacted in the future by UCL researchers who would like to invite you to participate in follow up studies to this project, or in future studies of a similar nature, please tick the appropriate box below.

	Yes, I would be happy to be contacted in this way	
	No, I would not like to be contacted	

_____	_____	_____
Name of participant	Date	Signature

Appendix H: Risk assessment

RISK ASSESSMENT FORM
FIELD / LOCATION WORK

The Approved Code of Practice - Management of Fieldwork should be referred to when completing this form
http://www.ucl.ac.uk/estates/safetynet/guidance/fieldwork/acop.pdf

DEPARTMENT/SECTION BARTLETT SCHOOL OF PLANNING - IPAD PROGRAMME
LOCATION(S) LONDON
PERSONS COVERED BY THE RISK ASSESSMENT EDWARD AITKEN

BRIEF DESCRIPTION OF FIELDWORK MASTERS DISSERTATION Primary DATA COLLECTION

Consider, in turn, each hazard (white on black). If **NO** hazard exists select **NO** and move to next hazard section.
If a hazard does exist select **YES** and assess the risks that could arise from that hazard in the risk assessment box.
Where risks are identified that are not adequately controlled they must be brought to the attention of your Departmental Management who should put temporary control measures in place or stop the work. Detail such risks in the final section.

ENVIRONMENT	**The environment always represents a safety hazard. Use space below to identify and assess any risks associated with this hazard**
e.g. location, climate, terrain, neighbourhood, in outside organizations, pollution, animals.	Examples of risk: adverse weather, illness, hypothermia, assault, getting lost. Is the risk high / medium / low ? Interviews may be conducted in outside organizations. Associated risks of adverse weather and getting lost are low and will be mitigated through sufficient planning.

CONTROL MEASURES	**Indicate which procedures are in place to control the identified risk**
☐	work abroad incorporates Foreign Office advice
☐	participants have been trained and given all necessary information
☐	only accredited centres are used for rural field work
☐	participants will wear appropriate clothing and footwear for the specified environment
☐	trained leaders accompany the trip
☐	refuge is available
☒	work in outside organisations is subject to their having satisfactory H&S procedures in place
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

EMERGENCIES	**Where emergencies may arise use space below to identify and assess any risks**
e.g. fire, accidents	Examples of risk: loss of property, loss of life

Loss of property is risk while using public transport, however, this will be mitigated by keeping belongings in enclosed bags and on my person at all times.

CONTROL MEASURES	**Indicate which procedures are in place to control the identified risk**
☐	participants have registered with LOCATE at http://www.fco.gov.uk/en/travel-and-living-abroad/
☐	fire fighting equipment is carried on the trip and participants know how to use it
☒	contact numbers for emergency services are known to all participants
☒	participants have means of contacting emergency services
☐	participants have been trained and given all necessary information
☐	a plan for rescue has been formulated, all parties understand the procedure
☐	the plan for rescue /emergency has a reciprocal element
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

EQUIPMENT	Is equipment used?	No	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. clothing, outboard motors.	Examples of risk: inappropriate, failure, insufficient training to use or repair, injury. Is the risk high / medium / low ?		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☐	the departmental written Arrangement for equipment is followed
☐	participants have been provided with any necessary equipment appropriate for the work
☐	all equipment has been inspected, before issue, by a competent person
☐	all users have been advised of correct use
☐	special equipment is only issued to persons trained in its use by a competent person
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

LONE WORKING	Is lone working a possibility?	Yes	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. alone or in isolation lone interviews.	Examples of risk: difficult to summon help. Is the risk high / medium / low?		

I will ensure help is summoned in times of need by establishing a strong working relationship with my supervisor. Meetings will be scheduled in advance of key milestones to mitigate any major challenges.

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☒	the departmental written Arrangement for lone/out of hours working for field work is followed
☐	lone or isolated working is not allowed
☐	location, route and expected time of return of lone workers is logged daily before work commences
☐	all workers have the means of raising an alarm in the event of an emergency, e.g. phone, flare, whistle
☐	all workers are fully familiar with emergency procedures
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

ILL HEALTH	The possibility of ill health always represents a safety hazard. Use space below to identify and assess any risks associated with this Hazard.
e.g. accident, illness, personal attack, special personal considerations or vulnerabilities.	Examples of risk: injury, asthma, allergies. Is the risk high / medium / low? Personal attack is possible but low risk as all research willl be conducted in London and I will be cautious in public spaces.

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☐	an appropriate number of trained first-aiders and first aid kits are present on the field trip
☐	all participants have had the necessary inoculations/ carry appropriate prophylactics
☐	participants have been advised of the physical demands of the trip and are deemed to be physically suited
☐	participants have been adequate advice on harmful plants, animals and substances they may encounter
☐	participants who require medication have advised the leader of this and carry sufficient medication for their needs
☒	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

Awareness of surroundings when travelling to various interview locations.

TRANSPORT	Will transport be required	NO		Move to next hazard
		YES		Use space below to identify and assess any risks
e.g. hired vehicles	Examples of risk: accidents arising from lack of maintenance, suitability or training Is the risk high / medium / low? Public transport will be used so I will be subject to normal disruptions and plan accordingly.			

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☒	only public transport will be used
☐	the vehicle will be hired from a reputable supplier
☐	transport must be properly maintained in compliance with relevant national regulations
☐	drivers comply with UCL Policy on Drivers http://www.ucl.ac.uk/hr/docs/college_drivers.php
☐	drivers have been trained and hold the appropriate licence
☐	there will be more than one driver to prevent driver/operator fatigue, and there will be adequate rest periods
☐	sufficient spare parts carried to meet foreseeable emergencies
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

DEALING WITH THE PUBLIC	Will people be dealing with public	Yes	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. interviews, observing	Examples of risk: personal attack, causing offence, being misinterpreted. Is the risk high / medium / low? Personal attack will be mitigated through an awareness of surroundings and scheduling meetings during daytime hours - low risk.		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☐	all participants are trained in interviewing techniques
☐	interviews are contracted out to a third party
☐	advice and support from local groups has been sought
☐	participants do not wear clothes that might cause offence or attract unwanted attention
☒	interviews are conducted at neutral locations or where neither party could be at risk
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

WORKING ON OR NEAR WATER	Will people work on or near water?	No	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. rivers, marshland, sea.	Examples of risk: drowning, malaria, hepatitis A, parasites. Is the risk high / medium / low?		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☐	lone working on or near water will not be allowed
☐	coastguard information is understood; all work takes place outside those times when tides could prove a threat
☐	all participants are competent swimmers
☐	participants always wear adequate protective equipment, e.g. buoyancy aids, wellingtons
☐	boat is operated by a competent person
☐	all boats are equipped with an alternative means of propulsion e.g. oars
☐	participants have received any appropriate inoculations
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

MANUAL HANDLING (MH)	Do MH activities take place?	No	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. lifting, carrying, moving large or heavy equipment, physical unsuitability for the task.	Examples of risk: strain, cuts, broken bones. Is the risk high / medium / low?		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
☐	the departmental written Arrangement for MH is followed
☐	the supervisor has attended a MH risk assessment course
☐	all tasks are within reasonable limits, persons physically unsuited to the MH task are prohibited from such activities
☐	all persons performing MH tasks are adequately trained
☐	equipment components will be assembled on site
☐	any MH task outside the competence of staff will be done by contractors
☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

SUBSTANCES	Will participants work with substances	No	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. plants, chemical, biohazard, waste	Examples of risk: ill health - poisoning, infection, illness, burns, cuts. Is the risk high / medium / low?		

CONTROL MEASURES **Indicate which procedures are in place to control the identified risk**

- ☐ the departmental written Arrangements for dealing with hazardous substances and waste are followed
- ☐ all participants are given information, training and protective equipment for hazardous substances they may encounter
- ☐ participants who have allergies have advised the leader of this and carry sufficient medication for their needs
- ☐ waste is disposed of in a responsible manner
- ☐ suitable containers are provided for hazardous waste
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

OTHER HAZARDS	Have you identified any other hazards?	No	If 'No' move to next section If 'Yes' use space below to identify and assess any risks
i.e. any other hazards must be noted and assessed here.	Hazard: Risk: is the risk		

CONTROL MEASURES **Give details of control measures in place to control the identified risks**

Have you identified any risks that are not adequately controlled?		
	NO ☐	Move to Declaration
	YES ☐	Use space below to identify the risk and what action was taken

Is this project subject to the UCL requirements on the ethics of Non-NHS Human Research? No

If yes, please state your Project ID Number

For more information, please refer to: http://ethics.grad.ucl.ac.uk/

DECLARATION The work will be reassessed whenever there is a significant change and at least annually. Those participating in the work have read the assessment.

Select the appropriate statement:

- ☒ I the undersigned have assessed the activity and associated risks and declare that there is no significant residual risk
- ☒ I the undersigned have assessed the activity and associated risks and declare that the risk will be controlled by the method(s) listed above

NAME OF SUPERVISOR John E. Ward

SIGNATURE OF SUPERVISOR DATE 3/4/19