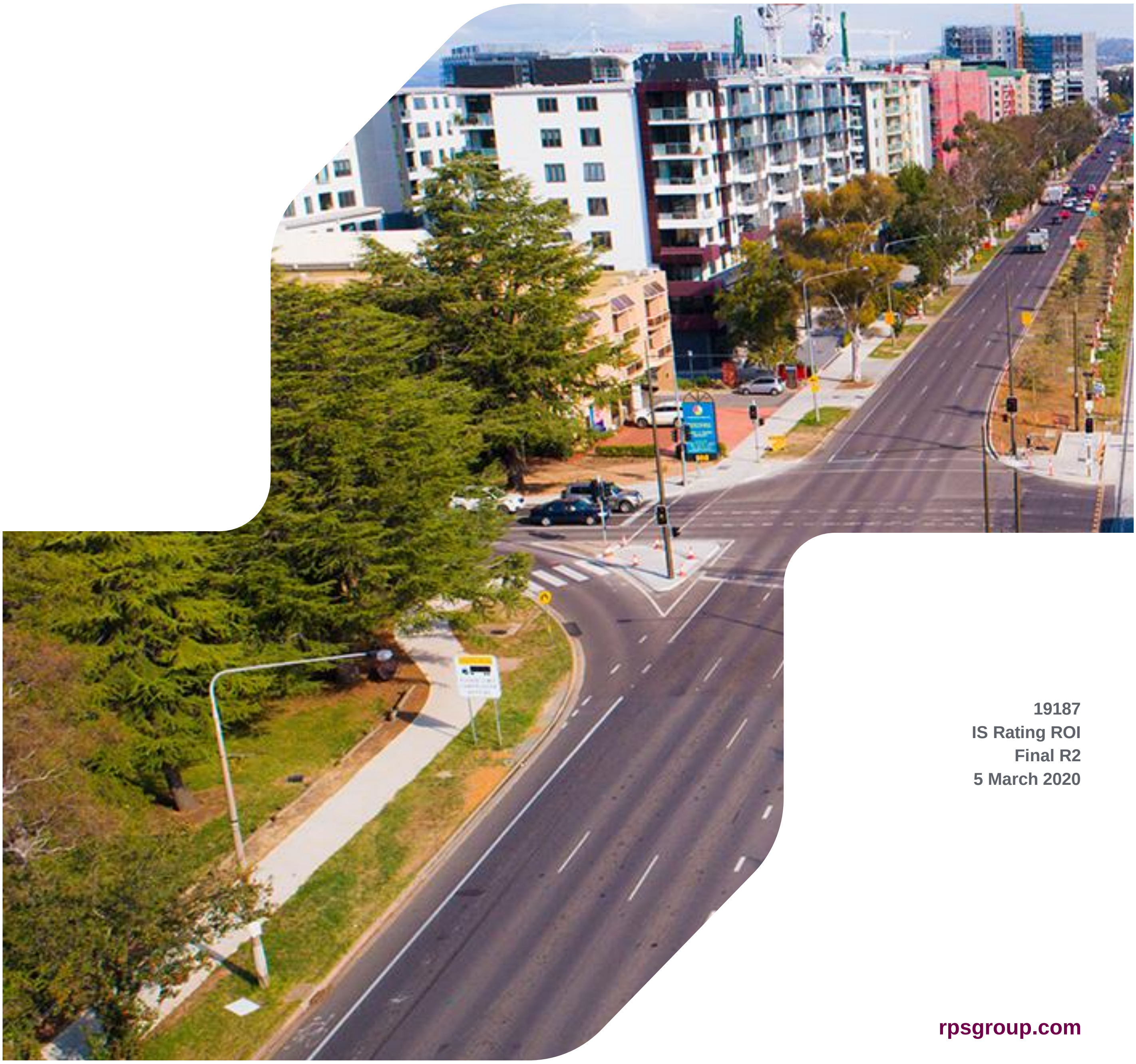
IS RATING SCHEME RETURN ON INVESTMENT

Cost benefit analysis of the Infrastructure Sustainability (IS) Rating Scheme



19187
IS Rating ROI
Final R2
5 March 2020

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Review date
1.0	Draft of methodology	Kapil Kulkarni	To be reviewed	
2.0	Draft incorporating provisional CBA results	Kapil Kulkarni	To be reviewed	
3.0	Final draft to client	Kapil Kulkarni, Beccy West	Nick Johnson	3/10/2019
4.0	Updated executive summary and BCR	Kapil Kulkarni, Beccy West		
5.0	Updated based on stakeholder comments	Kapil Kulkarni, Beccy West		
6.0	Updated based on peer reviewer comments	Kapil Kulkarni, Beccy West	Paul Davies	24/2/2020
Final report		Kapil Kulkarni, Beccy West		

Approval for issue

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EXECUTIVE SUMMARY

The Infrastructure Sustainability Council (ISC) has been supporting the infrastructure industry to drive best practice through the Infrastructure Sustainability Rating Scheme (IS Rating Scheme) since 2012. In this time, the scheme has actively contributed to capacity building and transparently measuring the social, environmental, governance and cultural outcomes delivered by more than $160 billion worth of infrastructure under rating. To help quantify the future benefits the scheme can deliver, ISC engaged RPS to assess the net benefits that IS Ratings provide to Australians. The study used a cost benefit analysis (CBA) or 'welfare economics' framework supported by stakeholder engagement.

A CBA framework assessed the costs and benefits to all impacted parties within Australia including not only the project proponents, but also the environment, community members and government. Targeted stakeholder engagement added to the robustness and richness of the findings because, consistent with the principles of Social Return on Investment (SROI), this reveals how stakeholders that are actually engaged by the program are affected.

IS Ratings set to deliver positive net benefits into the future

The CBA estimated the projected benefits and costs to future users of IS Ratings rather than the benefits already achieved by existing users. The modelling assumed that the use of the scheme is broadened to users that are currently only delivering business as usual levels of sustainability performance in infrastructure. This group is likely to derive the greatest benefits from using IS Ratings.

The assessment conservatively found that IS Ratings are projected to deliver a minimum of $1.6 in benefit for every $1 of cost over the period 2020-2040, and potentially up to $2.4 in benefit for every $1 of cost. The finding of a positive net benefit is robust to sensitivity testing. The estimate of net benefits is very conservative because, to simplify the analysis, not all of the benefits of sustainability outcomes have been included.

Moreover, many other sustainability outcomes that are expected to be material were not feasible to quantify because they are not measured in ways that facilitate monetisation. These include the benefits of open space, health outcomes and human capital development. Measuring these benefits in more objective, quantifiable and verifiable terms, could then facilitate estimation of their economic value. Due to these exclusions, the CBA is expected to provide a very conservative estimate of the net benefits of the scheme.

Higher net benefits can be achieved across all infrastructure sectors

Many of the proponents that have used the IS Rating Scheme take a leadership position in infrastructure delivery. These users have derived many benefits from using IS Ratings including better awareness and coverage of social, environmental, cultural and governance outcomes. This has increased their ability to communicate sustainability performance, ensure accountability with subcontractors and deliver capacity-building across the industry. In short, IS Ratings has improved sustainability outcomes for proponents that are committed to leading the way from a sustainable perspective.

However, the opportunities are likely to be even greater for infrastructure projects delivered by proponents that have not previously provided as much emphasis on sustainability, but are likely to do so in the future because of community or investor pressure and the need to achieve a social licence to operate from their stakeholders. These proponents can deliver the quadruple bottom line returns estimated by this study, by adopting IS Rating. The adoption of IS Ratings should be widened by targeting these proponents, as the potential incremental improvements are higher than the benefits to existing users.

IS Ratings facilitate benefits realisation, innovation and capacity building

IS Ratings provide transparent third-party measurement and verification of sustainability performance throughout the project lifecycle. This ensures that benefits are not only embedded at the planning stages and in business cases, but that these benefits are realised through delivery, and into commissioning and operations.

The IS Rating Scheme builds capacity in industry to improve the identification, selection, measurement and verification of social, environmental, governance and cultural outcomes. The capacity building element is particularly important as it drives collaboration, innovation and continuous improvement in the industry.

Without the IS Rating Scheme, the ability to effectively realise benefits, communicate verified outcomes and build capacity would be more challenging, and otherwise economic sustainability improvements would be missed or not fully realised. Capacity building and continuous improvements deliver a constantly increasing benchmark for better sustainability performance. As such, the IS Rating Scheme should continue to evolve with industry to ensure that it maintains its relevance and accessibility going forward.

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1 INTRODUCTION

1.1 Background

RPS was commissioned by the Infrastructure Sustainability Council (ISC) to assess the return on investment (ROI) from the Infrastructure Sustainability Ratings Scheme (IS Rating) to Australians.

This report:

- explains why the IS Rating provides value and what drives this value
- measures the value using a welfare economics approach, supported and complemented by stakeholder engagement
- compares this value to the costs of developing and operating IS Rating to estimate an ROI
- summarises key findings and recommendations.

1.2 Benefits of IS Rating

IS Rating helps supports the development and operation of more sustainable infrastructure in Australia. The benefits of infrastructure sustainability include:

- the protection of the natural environment including air quality, water quality and biodiversity
- more accessible and safe spaces for the community, and improved amenity
- respect for the rights and cultural needs of indigenous and ethnically diverse community members
- equitable access to essential services and social infrastructure
- the development of human and social capital to support long-term economic growth and productivity.

Communities highly value these outcomes. However, infrastructure developers and providers do not necessarily have all the incentives nor the expertise to design, construct and operate infrastructure to consistently deliver them. Without full information and the right incentives, infrastructure suppliers will find it challenging to deliver infrastructure that provides the best outcomes for the community.[1]

The IS Rating helps to close this gap. By facilitating the measurement, promotion and sharing of information on sustainability outcomes and how to improve them, IS Rating provides the incentives and knowledge required to improve infrastructure outcomes for the community. This is the ‘return’ that an IS Rating provides to the community.

1.3 Report objectives and approach

Framework and intended audience

This report aims to provide an analysis of the societal net benefit of IS Ratings. The findings are likely to be relevant for multiple stakeholders including infrastructure policy makers, infrastructure developers and operators, infrastructure professionals, interested members of the public and ISC.

The analysis utilises frameworks that are recommended by Government decision makers for the evaluation of policy and project decisions – welfare economics, and specifically cost benefit analysis (CBA). However,

[1] These inhibitors are often called ‘market failures’ because without the right information and incentives, markets do not provide optimal outcomes for society. Market failures include negative and positive externalities, split incentives, a lack of information, information asymmetry and lack of competition. These market failures result in infrastructure causing negative impacts to the community or equally, not realising positive benefits that could have been delivered cost effectively.

the analysis also expanded on, and complemented, these traditional frameworks through targeted stakeholder engagement.

Assessment and valuation of outcomes

Some of the outcomes delivered by IS Ratings may be valued with reference to market prices, while others require the application of non-market valuation methods. Therefore, the analysis draws on and consolidates findings from the literature on the value of these non-market outcomes.

A key challenge explored by the analysis is understanding how much of a difference the IS Rating makes. This requires estimating the incremental difference between having an IS Rating Scheme, compared to outcomes that would have occurred without it, often referred to as the ‘base case’ or the ‘counterfactual’ in a CBA.

The incremental difference is uncertain and has been less extensively studied than the value of the outcomes themselves. Therefore, this study explores the incremental impact of IS Rating using multiple methods, including through stakeholder engagement. The stakeholder engagement aims to understand the decision-making process that drives behaviour change towards more sustainable outcomes.

1.4 Document structure

The remainder of this report is structured as follows:

- Section 2 presents the assessment framework.
- Section 3 outlines the methodology and preliminary results from Phase 1.
- Section 4 outlines the methodology and results from Phase 2.
- Section 5 presents the final results of the study.
- Section 6 discusses key findings and recommendations.
- Section 7 provides the references cited in this report.
- Appendix A presents desktop research on sustainable construction materials.

2 ASSESSMENT FRAMEWORK

2.1 Overview of framework

Figure 1 provides an overview of the framework used to estimate the ROI.

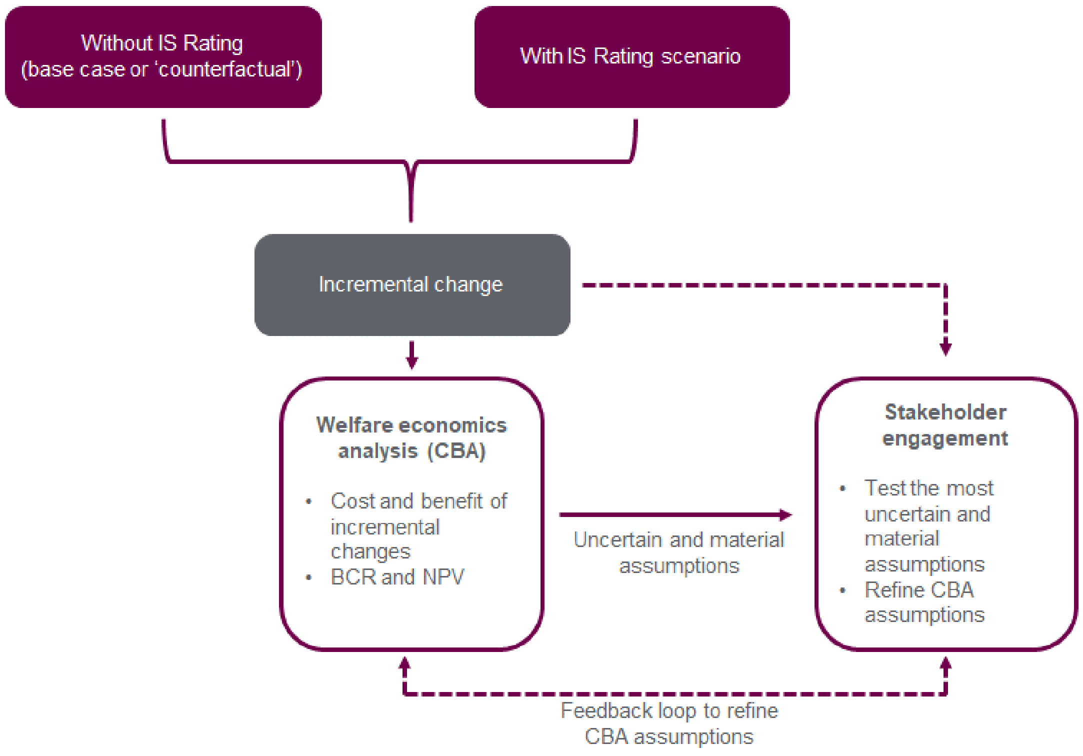

Figure 1 Assessment framework

The analysis uses CBA to estimate the ROI, which requires:

- defining the 'factual' (i.e. with policy / project scenario) and the 'counterfactual' (i.e. without policy / project scenario)
- understanding the incremental difference in outcomes between the scenarios
- estimating the incremental difference in costs between the scenarios
- estimating the incremental difference in benefits between the scenarios
- estimating the net benefit (or cost)
- expressing the results as a Benefit Cost Ratio (BCR) and / or Net Present Value (NPV), which express the ROI of a policy as a ratio or as an incremental benefit respectively.

This approach is often used to evaluate policy or project decisions. Building on this approach, the analysis then further explores the assumptions about incremental outcomes through stakeholder engagement, as a way of refining the assumptions and verifying the results.

The CBA is forward-looking. That is, it analyses the future impacts from IS Ratings.

PHASE 1

3 PHASE 1 – METHODS AND RESULTS

3.1 Use of welfare economics

The Phase 1 analysis uses welfare economics methods (i.e. CBA). An alternative to CBA is the Social Return on Investment (SROI) approach. The objective of SROI is similar to CBA as both aim to estimate the ROI, but employ different techniques to:

- assess the difference to outcomes made by a policy or project
- estimate the value of non-market outcomes.

Table 1 summarises the differences between the approaches.

Table 1: Comparison of CBA and SROI

	CBA	SROI
Estimation of incremental change	Compares factual scenario to counterfactual scenario	Consideration of deadweight, attribution and drop-off
Valuation of outcomes	Estimates of WTP using market or non-market valuation	Use of financial proxies[2]

The SROI approach frames the incremental difference of a policy or project using the following concepts (Supply Nation, 2018):

- **'Deadweight'**, which are the outcomes that would have been achieved even without the policy or project.
- **'Attribution'**, which is the proportion of the outcomes that can be ascribed to the policy or project.
- **'Drop-off',** which is the decline in outcomes that occur over time as the impact of the policy or project recedes.

CBA implicitly includes these concepts by incorporating the expected drop-off in the factual scenario (i.e. by considering the extent to which benefits may decline over time), and also considering deadweight[3] and attribution when assessing the difference between the factual and the counterfactual scenarios (i.e. by only valuing the outcomes that are incremental to what would have been achieved even without the policy or project).

With regards to valuation, CBA values outcomes using estimates of willingness to pay (WTP). Some outcomes may be valued with reference to market prices which, if markets are complete and well-functioning, can serve as an appropriate proxy to WTP. Other outcomes require non-market valuation techniques to estimate the WTP. Non-market valuation is applied by either surveying beneficiaries about their WTP (i.e. 'stated preference') or deriving WTP based on the behaviour of beneficiaries (i.e. 'revealed preference'). Non-market outcomes may also be valued by utilising estimates of WTP from other similar contexts, which is a method known as 'benefit transfer'.

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[2] A key difference between CBA and SROI is that to apply the latter, the actual stakeholders who are / will be affected by the change must be consulted. Whereas in CBAs, the value of outcomes can be estimated by adapting valuations from other contexts (e.g. a different country, different type of investment, different type of community etc.).

[3] The concept 'deadweight' in SROI should not be conflated with the concept of 'deadweight-loss' in economics. The latter refers to the loss to society that is incurred when markets do not provide the optimal outcomes to society.

By contrast, SROI applies financial proxies to value non-market outcomes. Financial proxies approximate the value of the outcome from the stakeholder's point of view (Social Ventures Australia, 2014). Financial proxies can be estimated by considering avoided financial costs, by valuing resources that may be reallocated to other beneficial purposes, or by using approaches similar to the revealed or stated preference methods[4].

This analysis aims to utilise the strengths of both the welfare economics and SROI frameworks. Welfare economics provides the policy evaluation foundation. However, the study also included stakeholder engagement, which is a key component of the SROI approach, to test the robustness and reliability of the CBA. While SROI measurement techniques were not used (e.g. the use of financial proxies etc.), stakeholder engagement provided useful information to qualify and interpret the results of the CBA.

CBA parameters

The CBA calculates present values (PV) of costs and benefits using a social discount rate of 7 per cent, and sensitivity discount rates of 4 and 10 per cent, consistent with Infrastructure Australia (2018) guidelines.

The CBA was conducted over a 21-year period from calendar year 2020 to 2040 and considers ongoing benefits or costs by calculating 'terminal values' (TV), which are the PV of costs or benefits at the end of the analysis horizon.

Definition and assessment of scenarios, and estimating incremental changes

For the purposes of the analysis, the CBA assumes that:

- IS Ratings are retained in the **factual** scenario and are continuously refined to ensure that they only rewards projects, through higher ratings, where these projects provide sustainable outcomes beyond business--as-usual (BAU)
- there are no IS Ratings in the **counterfactual** scenario.

Defining the scenarios in this manner facilitates an assessment of the incremental changes delivered by the IS Rating Scheme.

Projections of investment benefiting from IS Ratings

The economic analysis was based on projections of the amount of project investment required to undertake an IS Rating, expressed as $ million of capital value per year. The projections were developed by fitting a logarithmic curve to data from 2014 and 2019 on the amount of IS rated investment and extrapolating this investment over the period 2020 to 2040 (refer to Figure 2).

These projections are conservative because:

- the extrapolation is based on 2019 data from January to July only and the full-year 2019 capital value is likely to be higher
- the rate of future growth is uncertain because IS Ratings are still relatively new
- a logarithmic curve assumes a declining rate of growth, but the rate of growth may be higher and / or may increase in step-changes, if IS Rating is adopted as a standard by major infrastructure agencies.

[4] The revealed or stated preferences methods in an SROI study are applied in a somewhat different manner to economic studies (e.g. refer to Social Ventures Australia, 2014, Appendix 4).

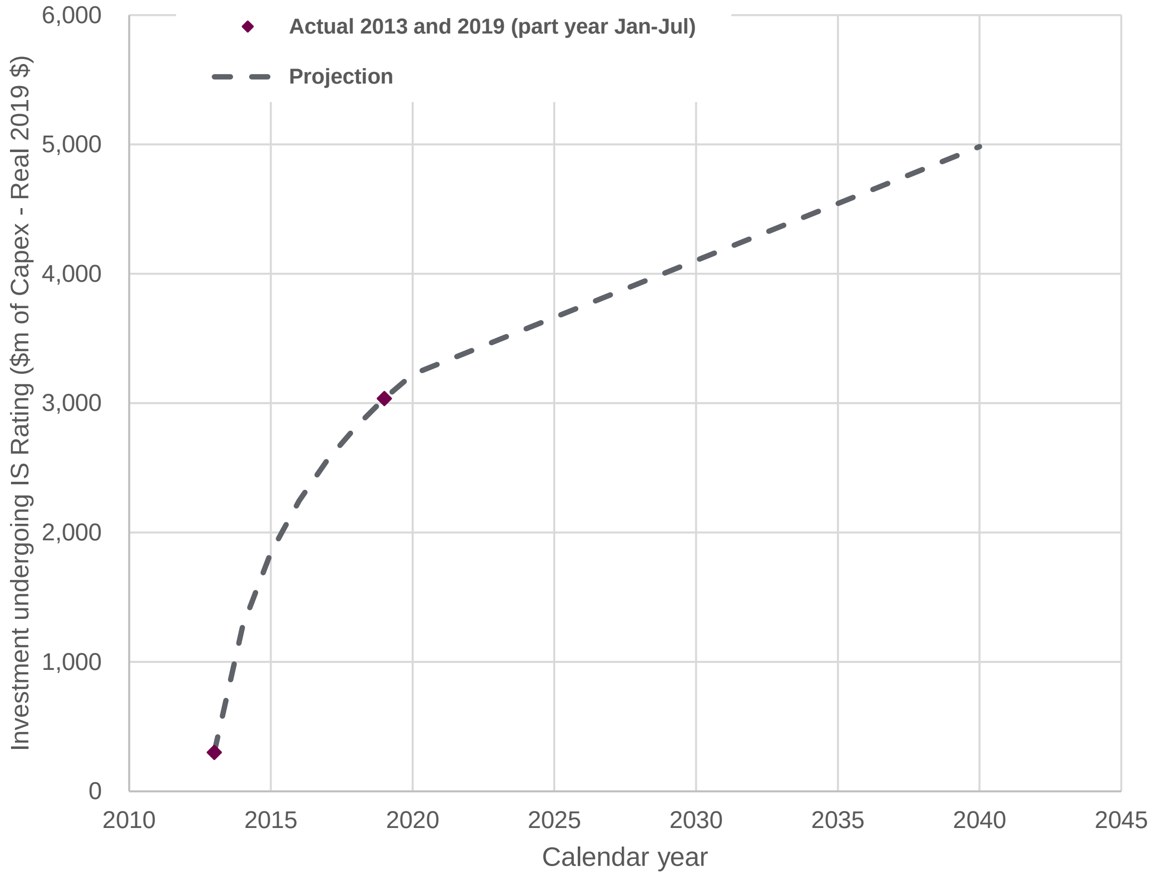

Figure 2 Projected investment undergoing IS Rating

Estimation of benefits

The ISC ratings database contains data on both credit scores for each of the ISC credit categories, as well as numerical estimates of the incremental energy, materials and water savings delivered by projects. These data sets were used to answer the question – *"How much of a difference in sustainability outcomes has been achieved through ISC's IS Ratings?"*

The ratings database provides a useful representation of incremental benefits because performance is measured against a *'verified baseline'*, which is the level of sustainability performance that is delivered as per BAU. The IS Technical Manual provides guidance on how to calculate baselines and assess the impacts of improvements (ISC, 2018). For some projects, the database includes negative sustainability outcomes (i.e. performance that is poorer than BAU).

Table 2 outlines the approach and assumptions used to estimate incremental sustainability improvements from rating.

Table 3 outlines the approach and assumptions used to value those outcomes.

The IS Technical Manual covers a much broader range of outcomes than those summarised in Table 2 and Table 3 including, for example, people and place benefits. However, many outcomes were not feasible to value because the definitions of rating scores in the IS Technical Manual do not readily translate to specific initiatives which can be valued in economic terms.

Table 2: Improvements achieved by ISC ratings

Outcome achieved by ISC ratings	Source	Approach
CO_2-e savings from reduced energy consumption	Ratings database	Calculated as a weighted average saving per unit of capital expenditure (CAPEX) based on individual project savings data for 2014 – 2019. Expressed as tCO_2-e saved per $m of infrastructure CAPEX.
kL of water saving	Ratings database	Calculated as a weighted average saving per unit of CAPEX based on individual project savings data for 2014 – 2019. Expressed as kL saved per $m of infrastructure CAPEX.
CO_2-e savings from reduced material use [1]	Ratings database	Calculated as a weighted average saving per unit of CAPEX based on individual project savings data for 2014 – 2019. Expressed as tCO_2-e saved per $m of infrastructure CAPEX.
Percentage reduction in air emissions	Ratings database	Calculated as a weighted average reduction based on the DIS-4 credit scores for individual projects from 2014 – 2019 and assuming[2]: • A score of 2 represents a 5% reduction. • A score of 3 represents a 10% reduction.
Percentage improvement in ecological value	Ratings database	Calculated a weighted average improvement based on the ECO-1 credit scores for individual projects from 2014 – 2019 and assuming[3]: • A score of 2 represents a 10% improvement. • A score of 3 represents a 20% improvement.

Note [1]: The ratings database provides estimates of lifecycle CO_2-e savings from reduced material use.

Note [2]: Percentage reduction / improvement based on credit scoring guidelines outlined in the ISC Technical Manual (ISC, 2018). The IS Technical Manual does not specify the percentage reduction. However, reducing emissions during construction by 5-10% (or higher) is often achieved through proactive monitoring and modelling, which is required to achieve a score of 2 or 3.

Note [3]: The IS Technical Manual specifies that achieving Level 1-3 requires improving ecological value by 0-20%.

Table 3: Valuation of outcomes achieved by ISC ratings

Assumption	Value	Approach
Value of CO_2-e savings	\$45.60 / tCO_2-e	Global social damage cost of carbon recommended by Nordhaus (2017) using the Dynamic Integrated model of Climate and the Economy (DICE). Adjusted to Australian dollars using market estimates of the exchange rate.
Benefits of water use reduction	1 tCO_2-e / ML [1]	Estimated based on Bureau of Meteorology (2018)
Value of air emission reductions	Refer to approach	The approach to value air emission reduction: • focuses on particulate matter (PM) emission reductions because PM tends to cause the most significant health costs, and is often chosen as an 'index pollutant'[2] • considers the average PM emission intensity during construction ($tPM_{2.5}$ / \$m) calculated based on estimates of infrastructure spend and corresponding emissions from the construction of the Melbourne Metro Tunnel (DEDJTR, 2016; Aurecon et al, 2016)[3] • applies estimated reductions • assumes an average avoided 'damage cost' from PM emissions of approximately \$200,000 / $tPM_{2.5}$, based on NSW DPE (2015) using damage costs corresponding to the main significant urban areas (SUAs) in NSW where infrastructure projects are being developed. [5]
Value of ecological outcomes	Percentage increase in the average ecosystem value of an infrastructure project (baseline value of approximately \$700,000 per project) [3]	Estimated based on the prices of biodiversity offset transactions posted to the Biodiversity Offsets Scheme public register. [4]

Note [1]: Benefits of water use reduction extends beyond greenhouse-gas (GHG) emissions. However, GHG emissions are both a material component of the benefit and amenable to valuation.

Note [2]: Guidelines on estimating the economic costs of air pollution recommend choosing an index pollutant instead of analysing multiple pollutants to avoid double counting health impacts.

Note [3]: The Melbourne Metro project is a representative project used to calculate the emission intensity during construction ($tPM_{2.5}$ / \$m). While construction emissions will vary widely depending on the type of infrastructure investment, and therefore the use of one project results in a simplification / generalisation, this assumption does not materially impact the key findings of the CBA.

Note [4]: Refer to https://www.environment.nsw.gov.au/biodiversity/offsets-scheme-public-registers.htm. Note the public register shows the value of transactions, which is influenced by the size of land impacted and the type and value of biodiversity on that land. The baseline value is calculated based on all transactions in the register. Note that infrastructure projects typically have a larger footprint than other (e.g. property development) projects, potentially understating the baseline value. This leads to a more conservative estimate of the value of ecological improvements.

Note [5]: Damage costs range from approximately \$100,000 / $tPM_{2.5}$ (Goulburn) to more than \$300,000 / $tPM_{2.5}$ (Sydney). Other major capital cities in Australian states and territories (e.g. Melbourne, Brisbane, Canberra, Perth) have damage costs within this range due to similar population densities.

Estimation of costs

The CBA considered three types of costs:

- the costs to ISC of administering IS Ratings
- the costs of achieving sustainability outcomes for a higher rating (or 'improvement costs')
- the costs to projects to undertake IS Ratings and to ISC to approve them.

Administration costs

ISC provided data on the full direct and indirect costs of developing, administering and operating IS Rating. Based on this data, the CBA estimated an annualised cost of approximately $1 million. Note that this amount excludes the costs to undertake and verify IS Ratings, which are separately discussed at the end of this section.

Improvement costs

IS Rating users are currently not required to report on the costs of achieving a higher rating (i.e. improvement costs). Therefore, the analysis could not use industry-reported cost data. To address these limitations, the CBA tested plausible assumptions for improvement costs, supported by desktop research on the costs of:

- using recycled steel for infrastructure
- using sustainable cement[5].

During construction, steel and cement can contribute to as much as 95 per cent of an infrastructure project's carbon footprint[6]. The desktop research, which is outlined in Appendix A, suggested that the incremental economic costs of using sustainable steel or cement are likely to be minimal.

In the absence of comprehensive data on improvement costs, the central estimates in the CBA consider the range of plausible prices and adopt a cost estimate that is within this range.

The plausible range of costs consists of a lower bound and an upper bound, following the below logic:

- even without IS Ratings, projects may already have financial incentives to achieve sustainability outcomes (e.g. a price signal for GHG emission reductions etc.)
- any additional improvement (i.e. above business as usual) is likely to cost more than that incentive because the lower cost opportunities would have already been taken-up by the market (providing a **lower bound** to the cost)
- costs are unlikely to be higher than the externality benefit value because this would not be justifiable through a business case / social CBA assessment (providing an **upper bound** to the cost)
- the costs are likely to between the lower and upper bound depending on available improvement opportunities.

For each benefit, the costs were assumed to be higher than the lower bound by **25 per cent** of the range between the lower and upper bound (refer to Figure 3).

The CBA considers incremental costs only. Therefore, the costs of achieving business as usual sustainability improvements (e.g. emission reductions that are supported through financial incentives alone and ecological

[5] Cement that uses waste products and / or has lower embodied carbon than conventional cement
[6] Based on discussions with ISC.

outcomes supported through legislative requirements for offsetting etc.) would be incurred in both the base case (without IS Ratings) and the factual scenario (with IS Ratings). Hence, these costs are not incremental and not estimated in the CBA.

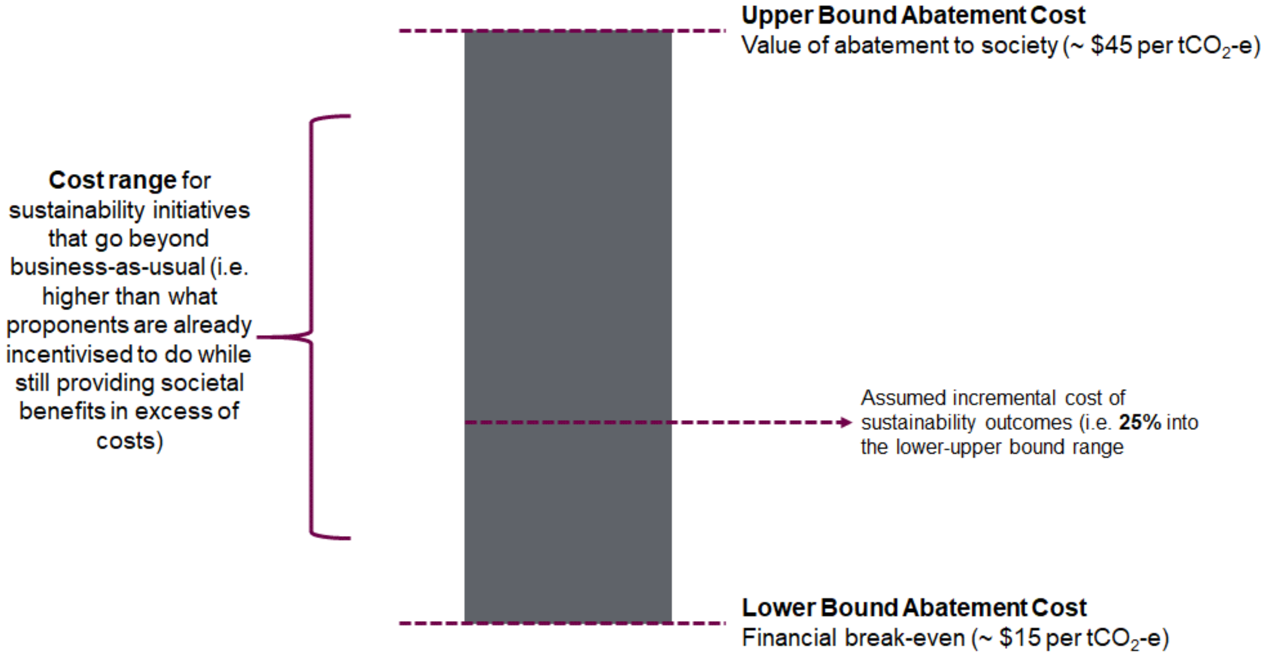

Figure 3 Assumed cost of sustainability improvements

A further rationale for this assumption is that:

- projects will exploit the lowest cost of abatement opportunities first
- various studies have shown that low cost abatement opportunities (i.e. between 0 – 25 per cent of externality values) are available for the outcomes (e.g. refer to Energetics, 2016; ACIL Allen Consulting, 2015 etc.).

Appendix A further explains why this assumption is supported by desktop research on sustainable steel and cement.

Costs to undertake and verify IS Ratings

The assumed costs to undertake IS Ratings, including for ISC to approve them, were based on data from a CBA by Hedges (2019) on the costs and benefits of the Torrens Road to Torrens River (T2T). The report provided data from a previous study by CPB contractors that shows an approximately 1.25 full-time equivalent (FTE) sustainability personnel resourcing required per $ billion of project capital value. Based on these data, the CBA assumed that:

- undertaking IS Rating requires 0.75 FTE of project personnel (i.e. half of the sustainability staff's time) working on the project per $ billion of capital value
- approving this rating requires an additional 50 per cent (i.e. 0.375 FTE per $ billion) of effort at ISC
- an FTE personnel cost, including on-costs, of $150,000 per annum.

This cost estimate is considered conservative because the project's sustainability personnel are likely to be working on many matters other than IS Ratings alone.

3.2 Preliminary results

Key economic results

Figure 4 summarises the estimated benefits and costs of IS Ratings.

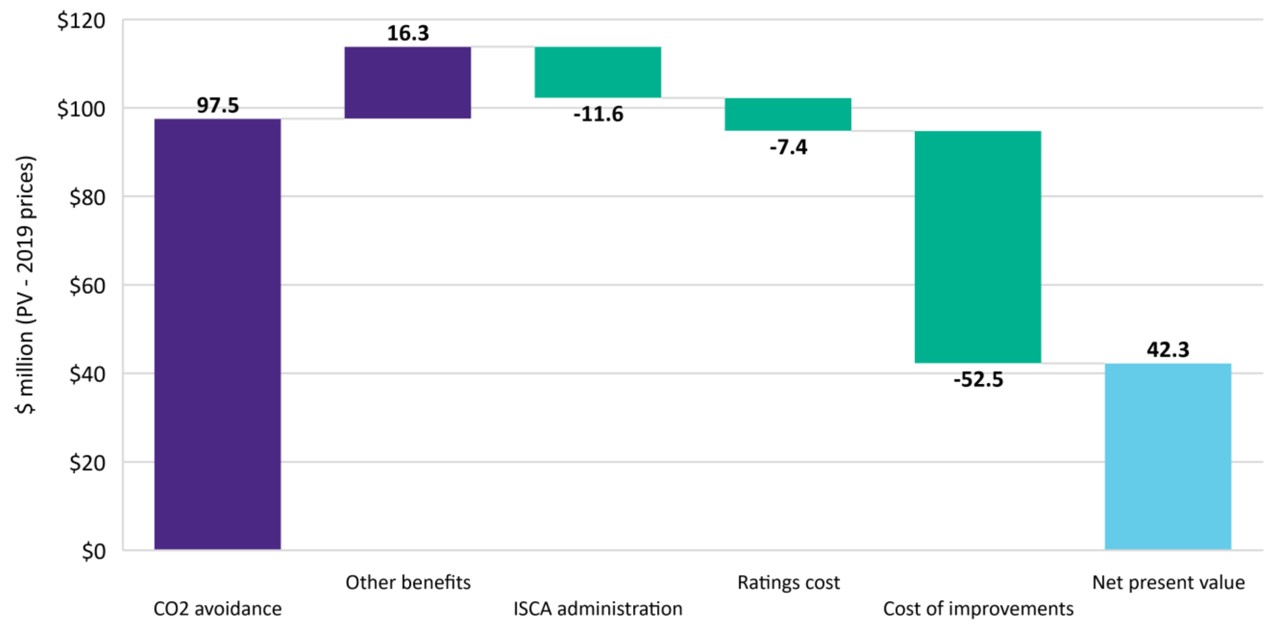

Figure 4 Benefits and costs of IS Ratings

Based on the analysis, IS Rating is estimated to provide a net present value (NPV) of $42.3 million in net benefits to Australians over the period 2020 to 2040, and a benefit-cost ratio (BCR) of 1.6, using a 7 per cent discount rate.

Sensitivity of results to assumptions

Figure 4 illustrates the impact of key uncertain assumptions on the results. The sensitivity testing assesses the impacts of alternative values for[7]:

- the discount rate (7, 3 or 10 per cent)
- the costs of achieving sustainability outcomes or 'improvement cost' (testing 50% into the lower-upper bound range instead of 25%)
- the rate of growth in ratings or 'ratings take-up' (testing double the amount of project investment than that assumed in the central estimates).

Another key uncertain assumption is the global social damage cost of carbon, which some sources estimate to be much higher than that used in this study. The sensitivity analysis did not test the impact that a higher assumption would have on the CBA results. However, a higher global social damage cost of carbon would result in an almost proportional increase in the estimated NPV.

[7] All tests use a 7 per cent discount rate except for the tests that specifically use a 3 or 10 per cent rate.

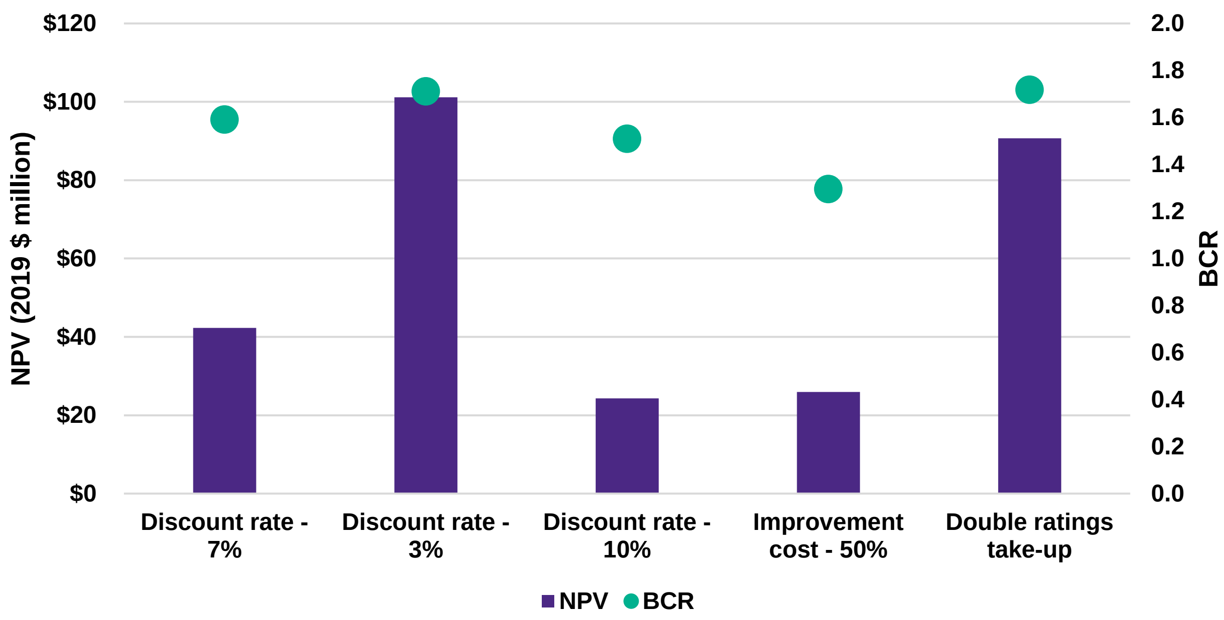

Figure 5 Sensitivity analysis

The sensitivity analysis shows that the net benefit remains positive in the selected sensitivity tests.

Unquantified benefits

The CBA estimates exclude some key benefits that can have a very high value when expressed in economic terms. These include:

- Open green space, which is highly valued by community members. Studies have shown that the value of open green space is also reflected in home prices (e.g. refer to Black, 2018). Ambrey and Fleming (2012) estimated a WTP of $1,168 in annual household income for a 143 m^2 (1 per cent) increase in public green space. As an example of the order of magnitude benefits from an infrastructure project, the Level Crossings Removal Project (LXRP) plans on including 22.5 hectares of open space along the Caulfield to Dandenong corridor[8]. Using some simplifying assumptions, the potential benefit of this space could be approximately $46 million in present value (PV) terms[9]. This is more than the total NPV estimated in this study's CBA.

- The open green space planned by LXRP also includes walking and cycling trails. The health benefits of active travel have been extensively studied (e.g. refer to Garrad, 2009) and if they can be accurately measured, they can be valued in a CBA.

- The development of human capital can also be included in a CBA if this can be measured. Studies have estimated that improving the productivity of the labour force has significant economic value. For example, Deloitte Access Economics (2016) estimated that a higher qualification adds approximately $1 million in lifetime income (undiscounted) per person, depending on the profession.

The LXRP data were used to provide an indication of the benefits of open green space. The $46 million PV of benefit from the LXRP corridor can be compared to the cost. The LXRP project includes a $15 million maintenance fund for the long-term care of the new open space. The land may not have a significant opportunity cost because it is adjacent to the railroad track, forming part of the land offset buffer, and

[8] https://levelcrossings.vic.gov.au/media/news/open-space

[9] Assuming that along the corridor, the green space benefits 3 homes either side of the corridor.

therefore unsuitable for residential, commercial or industrial use. In fact, establishment of the land as green space may even avoid some maintenance costs in alternative use. Therefore, assuming that:

- the measure provides a $46 million PV benefit
- for a $15 million PV of cost
- for a project capital investment of $7.6 billion (Level Crossing Removal Project, 2017)
- results in an NPV of $4 million PV per $1 billion of project capital investment.

Extrapolating this additional benefit over the scale of projected ISC-affected capital investment in the CBA, increases the BCR to 2.4.

PHASE 2

4 PHASE 2 – METHODS AND RESULTS

4.1 Methods and assumptions for stakeholder engagement

Approach

The aim of Phase 2 of the research was to inform, refine and add depth to the Phase 1 findings through stakeholder engagement.

Based on the outputs of Phase 1, the aim for Phase 2 was to gain:

- a deeper understanding of benefits, both those considered material but hard to quantify and not captured during Phase 1
- a deeper understanding of the drivers of sustainability investment decision making.

Given the desired outputs and breadth of projects using IS Ratings, a pragmatic approach was taken focusing on engaging stakeholders from a selection of key projects with the aim for depth over breadth. That said, the projects selected do represent a range of industries and geographies.

The Phase 2 approach was initially proposed to take the form of a stakeholder workshop, however, to ensure the engagement approach complimented the findings of Phase 1, the approach was finalised once Phase 1 had been completed. Given the geographic selection of projects, the preferred method of engagement was phone interviews. In addition, given the possible commercial sensitivity of some of the topics of conversations it was decided these would be one-on-one conversations with organisations. To allow for common themes to be identified and comparisons drawn, a semi-formal interview approach was taken during these calls.

Desired outputs of Phase 2

The desired outputs of the engagement were to:

- capture additional data that can inform Phase 1
- understand uncaptured benefits or costs that can be valued in Phase 1
- have a clear understanding of the drivers of sustainability investment decisions
- identify case studies to add richness to the economic analysis.

These outputs would allow for a meaningful refinement of Phase 1, ensure the views of those using the IS Rating were heard and considered.

To gain these outputs, stakeholders were asked the below questions:

Detail
• Introductions
• Overview of study aim and Phase 1 findings
Overview of Project • What and where is your project? • What was the project's involvement with ISC? • Have you used the IS Rating previously?
Decision making - to further refine the outputs of Phase 1 we are keen to better understand what drives sustainability investments on projects • During what stage in the project lifecycle are decisions made about investment in sustainability initiatives? • Is this the same as the stage you think project decisions should be made? • What do you think are the main drivers of sustainability investment decisions? • In your view are these the right drivers? • Is there enough evidence to inform them? • Are there any key benefits you think would inform better decision making if they were better understood?
Benefits **Intro: During Phase 1 we have focused on the material benefits we can begin to quantify through an economic assessment. We are keen to test if these are the 'right' benefits, if there are any we have missed, or if there is project data available which will allow us to quantify additional benefits.** • You heard an overview of the main benefits we have quantified during Phase 1 of the project. In your view are these the key benefits? – If yes, why? – If no – what have we missed? • Were benefits tracked as part of your project. If so, what were they and what data was available? • As a member of the sustainability team do you think your perception of the benefits are different to those of people in other parts of the project – for example the Project Director? • Following on from this, is there a benefit to the project or community you think it would be important to quantify? This could help drive internal buy-in or buy-in with the community?

Selected organisations

Based on ISC's recommendations, the below organisations were approached to be involved in the study.

Organisations	Sector	Region	Nominated interviewees
Level Crossing Removal Authority (LXRA)	Transport	VIC	• Fin Robertson • Tracy Carey
Sydney Metro	Transport	NSW	• Jo Haggerty • Richard Liao
Sydney Water – South Creek Treatment Plant	Water	NSW	• Gill Fowler • James Logie
Cardrona Alpine Resort Limited	Alpine resort	NZ	• Erik Barnes • Monique Cornish
Main Roads WA	Transport	WA	• Louis Bettini

All were sent an initial invitation and then participated in a one-hour phone conversation (or, in the case of MRWA, a face-to-face interview).

4.2 Key findings from Phase 2

The key finding from Phase 2 was that the IS Rating is predominately used for benchmarking and external validation rather than a tool to drive decision making.

The below table summarises the outputs of Phase 2 against the desired outputs.

Table 4: Phase 2 outputs

Desired output	Output from stakeholder engagement
• Capturing additional data that can inform Phase 1	• Identifying additional data to inform Phase 1 was a challenging, particularly challenging was data on community, health and wellbeing benefits. • There was feedback from all stakeholders that quantifying these benefits would be beneficial however there are no agreed frameworks to do this.
• Understand uncaptured benefits or costs that can be valued in Phase 1	• Understandably the benefits discussed varied across the different projects. For some, it was agreed carbon reduction was a key benefit and therefore Phase 1 was appropriate. • Other benefits highlighted were: – providing community amenity and green space – driving organisation culture change and workforce upskilling to support more sustainable behaviours – developing active transport routes – improvements to waterway health
• Have a clear understanding of the drivers of sustainability investment decisions	• Stakeholders told us the IS Ratings was not driving sustainability investment decisions instead it was valued as a benchmark and provide external validation to existing decisions. • The drivers of sustainability decisions varied across different projects and organisations, these included: – an organisations corporate plan or commitments – organisation value or culture – alignment to other project drivers including cost and resource efficiencies – Government policy and guidelines – risk reduction – general maturity of industry and societal expectations. • Although the IS Rating is predominately used for benchmarking and external validation, examples were given where the rating impacted when sustainability initiatives were implemented or prioritised.
• Case studies to add richness to the economic analysis.	• One example of a social benefit shared was the creation of open space as part of the Level Crossing Removal Authority.

As detailed above the stakeholder engagement did not fully deliver our desired outputs. The main driver for this was a challenge to our assumption on how the IS Ratings were being used. However, there were key common themes across the feedback from stakeholders, which have fed into Phase 1 and shaped the reports key recommendations.

Key themes from stakeholder engagement

- **Benchmarking and external validation** – there was clear feedback from the stakeholders interviewed that the IS Rating was highly valued for benchmarking and providing external validation, rather than being a driver for sustainability investment decision making. One stakeholder describes it as 'wrapping around' what they were already doing. One factor driving this was the IS Rating being used during the later stages of the project lifecycle leading to a focus on improving existing plans, rather than shaping early decision making. It is worth noting the stakeholder we engaged represented projects or organisations with a high level of maturity in their approach to sustainability. We can assume our findings might not be replicated across the whole industry.

- **Benefit of upskilling and capacity building** – a universally acknowledged benefit of the IS Rating was its ability to drive upskilling and capacity building within the infrastructure industry. There were several reasons for this, including that IS Rating:

  – helps to make sustainability easier to understand and conceptualise

  – provides a framework to stretch organisations

  – facilitates internal and contractor conversations on sustainability

  – encourages and facilitates information sharing across the industry

  – raises the bar for the industry as a whole by providing a framework for competition.

  It was highlighted that the opportunity to maximise the benefit of capacity building can vary between the private and public sector due to the level of involvement the proponent has. For example, in the public sector the IS Rating is increasingly being built into tender requirements and is therefore delivered by a contractor with involvement in one stage of the project. This limits the potential for capacity building across the project as a whole. The private sector was noted to demonstrate a higher potential for capacity building as the same teams are involved in all stages of the project lifecycle so learnings can directly feed into future projects. In addition, there is the ability to understand if assets are performing to their design intent and delivering sustainability benefits.

  This benefit links to the value of the IS Rating as a process versus the final project rating. This is discussed in more detail below.

- **Materiality and whole of project view** – materiality is a common theme in all sustainability discussions, and it was unsurprisingly referred to by all stakeholders in relation to the IS Rating scheme. One part of this was balancing the IS Rating scheme allowing for comparison across the industry whilst focusing on outcomes material for different sectors, this is discussed further below in rating versus outcome. The second part to the feedback was challenging how the IS Ratings scheme considers the overall impact of a project and what it is designed to do versus how it is being delivered. For example, the sustainability benefits of a road compared to those of a wastewater treatment plant. The scale of a project also has a role in these discussions.

- **Aligning and quantifying social impacts** – one of the key limitations of Phase 1 was not being able to include some key benefits in the assessment because they were difficult to quantify based on the data available (e.g. community and health benefits). The engagement did not provide us with clear data we could use to feed into Phase 1, however it did highlight some of the challenges around valuing social and community outcomes. All stakeholders saw value in work to further measure and quantify these benefits and felt it would help to drive decision making, however some felt guidance is needed from Government to ensure a common approach was used, therefore ensuring any measures were credible.

  The recognition of benefit over time was closely linked to this; the focus remains on delivery to time and budget; however certain social and community benefits are realised over time. Therefore, common quantification of benefits would need to go hand in hand with a longer-term outlook for project benefits realisation and KPIs in place to reflect this.

  Examples of areas it would be beneficial to do further work to measure and quantify included:

  – upskilling within the industry

  – community benefit of improved waterway health

  – creation of open space

  – value of local sourcing (materials and labour)

  - value of social housing
  - regional and state health
  - active transport.

- **Rating versus outcomes** – stakeholders articulated the difference between the benefits of the process of using the IS Rating versus gaining the rating itself. For many, the main benefits were derived from the process; namely capacity building within the project team and supply chain. The benefit of gaining the rating itself was by some seen to be diminished due to the burden of evidence collection. Focusing on the intent of the rating, rather than a 'numbers game', was seen by some as important in helping to maximise value.

- **Shaping the business case** – a key part of the feedback discussed where the IS Rating is being used in the project lifecycle. Many of the examples discussed showed that IS Ratings are being used closer to delivery rather than inception and that this reduced its potential to influence decision-making.

  To realise the benefits of the IS Rating scheme and maximise its potential influence over decision -making it needs to be built into the project planning and business case development.

- **Driving focus on procurement and the supply chain** – a concrete example of the IS Rating influencing decision making was in the approach used to drive best practice through supply chains and requirements in tenders. Stakeholders gave several examples of where the IS Rating had either driven project teams to focus further down the supply chain, include additional requirements in tenders, or change the tender assessment process. For one project, this led to a tender award being based on sustainability values rather than financial cost.

FINAL RESULTS

5 FINAL RESULTS

5.1 Use of Phase 2 findings for testing Phase 1 results

Following Phase 2, the project team reflected on the analysis in Phase 1 and assessed the robustness and reliability of the results. The key implications of Phase 2 for the first phase were that:

- Stakeholders identified many benefits that were not feasible to include in the CBA. If these benefits could be measured in more objective, quantifiable and verifiable terms, future work could estimate their economic value.
- Many of the proponents that have used IS Ratings are committed to sustainability and may have identified and implemented some above-BAU sustainability improvements without IS Ratings. Nonetheless, the benefits of IS Rating include:
  - a holistic view of sustainability that covers a wide range of environmental and social outcomes, as opposed to discrete sustainability initiatives with a narrow focus
  - the ability to measure and demonstrate sustainability performance using an independent framework
  - the ability to cascade sustainability goals to sub-contractors and thereby improve the sustainability performance of sub-contractors, and importantly
  - build capacity in the profession to improve the identification, selection, measurement and verification of sustainability measures[10].
- Because some sustainability leaders are already committed to delivering sustainability outcomes, the incremental improvement estimated in the CBA is not likely to apply to all the 'sustainability leaders'. Rather, the incremental improvement would apply to proponents that, without the right capability or incentives, have been delivering a BAU level of sustainability performance, or less. The adoption of IS Ratings should be widened by targeting these proponents, as the potential incremental improvements are much higher.
- IS Ratings facilitate the measurement and verification of sustainability performance throughout the project lifecycle. This ensures that benefits are not only included at the business case and planning stages, but that these benefits are realised after commissioning, operation and decommissioning.

5.2 Revision to interpretation of Phase 1 findings

Due to the reasons outlined in Section 5.1, the results of the CBA should be interpreted as the potential benefit delivered by IS Ratings, if the adoption of the scheme is widened to target proponents with BAU or lower levels of sustainability performance. The scheme would provide greater value in this segment of the market. If this segment could be effectively targeted, the benefits are likely to be even larger than estimated in the preliminary CBA (refer to Section 3.2) because there are likely to be many more proponents that are not delivering sustainability outcomes to the level of the leaders included in the analysis.

Figure 6 shows the costs and benefits of a more rapid take-up (i.e. double the rate of growth in the scheme than assumed in the preliminary estimates). In this scenario, IS Ratings are estimated to provide a net present value (NPV) of $90.7 million in net benefits, and a benefit cost ratio benefit-cost ratio (BCR) of 1.7, using a 7 per cent discount rate.

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[10] The capacity building element is particularly important as it drives innovation and continuous improvement in the industry.

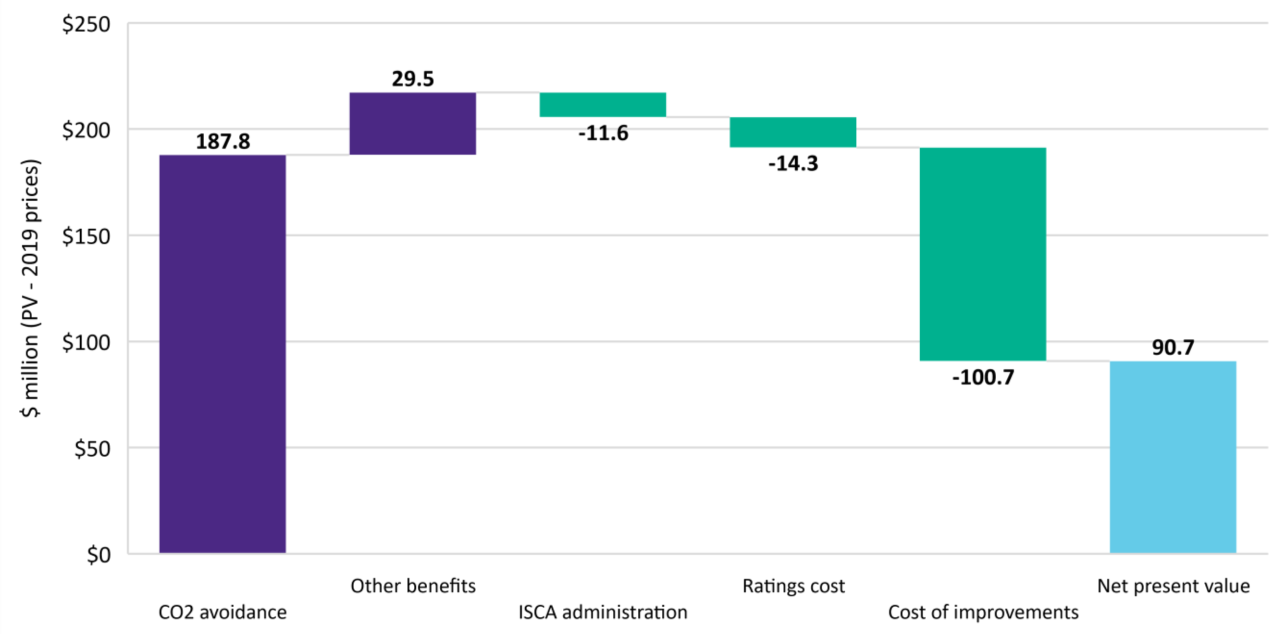

Figure 6 Economic costs and benefits with more rapid take-up

While the benefits of targeting different segments are likely to be large, the benefits could also be lower if:

- IS Ratings can only capture a small portion of this market segment
- the incremental improvements are lower.

Additional sensitivity analysis shows the outcome in those two scenarios, including firstly, if the take-up was half that projected in the central estimates, and secondly, if the incremental improvements were half of what is assumed in the central estimates. In both scenarios, IS Ratings are still projected to deliver positive net benefits.

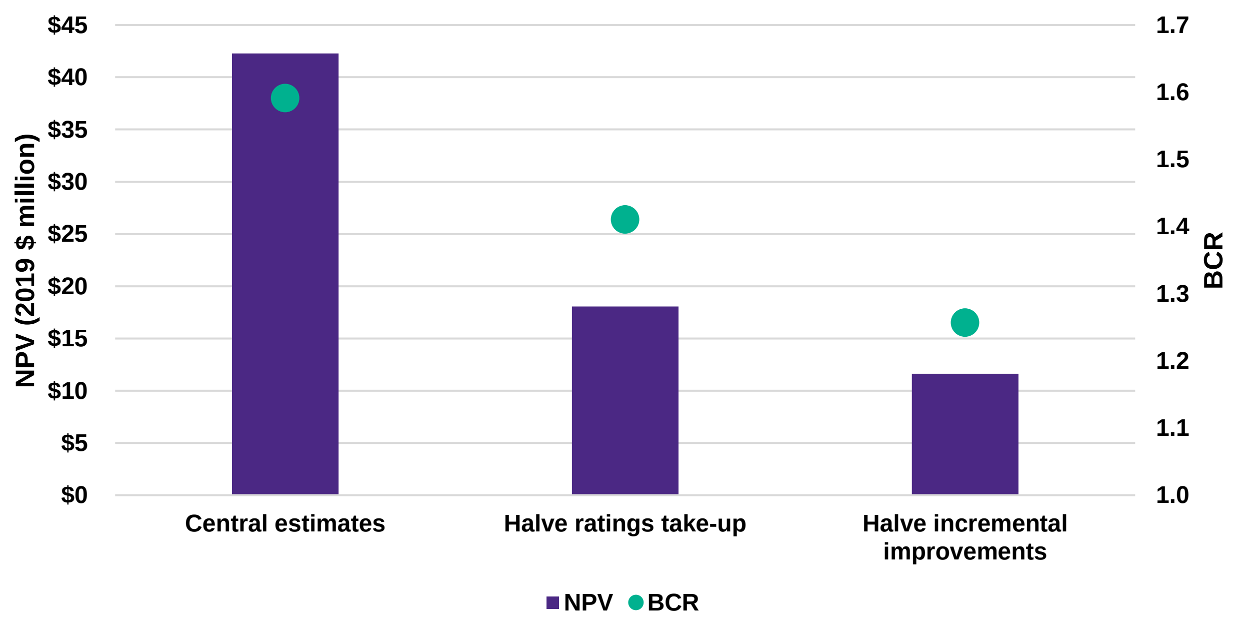

Figure 7 Sensitivity of results to lower take-up and lower incremental improvements

5.3 Limitations and qualifications

The study required using various assumptions due to data and other project constraints. The main limitations of the analysis are that:

- many benefits for modelled outcomes have not been included (e.g. reduced water use provides benefits beyond GHG emission reduction etc.)
- many other outcomes have not been included because they are less amenable to quantification (e.g. community and health benefits)
- benefits were estimated using the IS Technical Manual (ISC, 2018), however, the actual performance of projects is not always verifiable in practice (e.g. emissions during construction is not always monitored)
- ISC-rated projects tend not to disclose the costs of achieving sustainability outcomes, due to commercial sensitivities and so the analysis has used plausible assumptions for these costs
- the stakeholder engagement was conducted with a small targeted group and is therefore not a representative sample
- the stakeholders we spoke to represent best practice[11] in the industry rather than a sample of the infrastructure industry as a whole
- the report recognises there are differences of opinion around how influential the IS Rating is to sustainability investment decision making and, in particular, it has been challenging to definitively agree on the BAU without ISC's IS Rating Scheme.

[11] Best practice includes assessing infrastructure sustainability performance using uniform and transparent criteria, which provides confidence to stakeholders on the environmental and social impacts of the project (Bennon and Sharma, 2018).

6 FINDINGS AND RECOMMENDATIONS

Welfare economic analysis using conservative assumptions and supported by stakeholder engagement shows that the IS Ratings scheme is projected to deliver $1.6 in benefit for every $1 of cost over the period 2020-2040. The finding of a positive net benefit is robust to sensitivity testing. The estimate of net benefits is conservative because, to simplify the analysis, not all of the benefits of sustainability outcomes have been included. Moreover, many other sustainability outcomes that are expected to be material were not feasible to quantify because they are not sufficiently measured. These include the benefits of open space, health outcomes and human capital development.

Engagement with project proponents revealed that:

- Stakeholders identified many benefits that were not feasible to include in the CBA. If these benefits could be measured in more objective, quantifiable and verifiable terms, future work could estimate their economic value.
- Stakeholders noted the benefits from using IS Ratings including better awareness and coverage of social, environmental, cultural and governance outcomes. This has increased their ability to communicate sustainability performance, ensure accountability with subcontractors and deliver capacity building across the industry.
- Many of the proponents that have used IS Ratings are committed to sustainability, and may have identified and implemented some above-BAU sustainability improvements without IS Ratings.
- Stakeholders noted that opportunities are likely to be greater for infrastructure projects delivered by proponents that have not placed as much emphasis on sustainability. This is likely to change in the future due to community or investor pressure and the need to achieve a social licence to operate from their stakeholders.
- The adoption of the scheme should be widened by targeting proponents with BAU or lower levels of sustainability performance, as the potential incremental improvements will be higher than the benefits to users already committed to sustainability. The CBA shows that widening the scheme to these users with BAU or lower levels of sustainability performance would deliver substantial benefits.
- IS Ratings facilitate the measurement and verification of sustainability performance throughout the project lifecycle. This ensures that benefits are not only included at the business case and planning stages, but that these benefits are realised after commissioning, operation and decommissioning.

Due to the above, the results of the CBA should be interpreted as the potential benefit delivered by IS Ratings if the adoption of the scheme is broadened by targeting companies with BAU or lower levels of sustainability performance. The scheme would provide greater value in this segment of the market. If this segment could be effectively targeted, the benefits are likely to be even larger than estimated in this CBA because there are likely to be many more proponents that are not delivering sustainability outcomes to the level of the leaders included in the analysis.

Based on our assessment, we recommend that:

- ISC continue to improve IS ratings to measure outcomes with a high societal value (e.g. community health and wellbeing, human capital development etc.) in ways that can be quantified in economic terms
- IS Ratings should be considered early in the planning stages of major projects, as it would enable early identification of economically feasible sustainability improvements and provide a uniform approach to assessing the relative performance of project options
- IS Ratings will deliver greater value if the scheme targeted segments of the market that would not have otherwise pursued leadership in sustainability outcomes

- infrastructure proponents continue to utilise IS Ratings not only as a way of demonstrating their sustainability performance but also to build capacity in the industry and lift sustainability standards across the board.

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APPENDICIES

Appendix A Sustainable steel and cement costs

A.1 Steel

The benefits of using recycled steel include avoided environmental impacts from resource extraction, beneficiation and refining; with the global warming potential (GWP) of recycled steel being 510 kg CO_2-e per tonne of steel compared to 2,170 kg CO_2-e per tonne of steel for primary steel (Norgate, 2013).

The steel and cement industries in OECD countries operate in competitive markets with low profit margins (Bataille, 2019). As such, any supply of recycled steel in the Australian market would need to price competitively with primary steel.

Bluescope steel sourced approximately 45 per cent aggregated recycled steel in their procurement of raw materials for steel making in 2017/18 (Bluescope Steel, 2019). Data on the cost premium (or discount) for producing steel using recycled material compared to virgin materials is not readily available. Therefore, estimating the incremental costs of using recycled steel, compared to primary steel, is difficult.

An earlier cost benefit analysis from New Zealand reported significant positive net benefits from steel recycling, suggesting that the incremental benefits far outweigh the incremental costs (Denne et al, 2007). More recently, Australian crude steel production is estimated to use up to 25-35% recycled content (Golev and Corder, 2015), suggesting that recycling steel is commercially feasible (i.e. it is of comparable cost to using virgin resources).

Denne et al (2007) estimated net benefits of between $50 and $400 per tonne of steel, compared to a market value of $120 per tonne of steel at the time, suggesting a relatively high benefit-cost ratio. Since that CBA was undertaken, the raw material costs for steel making (e.g. iron ore, coking coal, energy etc.) have increased substantially, together with an increase in prices for crude steel.

Scrap metal prices tend to be linked to the prices for primary steel (Söderholm and Ekvall, 2019). As such, scrap metal prices have also increased in line with the increase in crude steel prices. However, the costs of scrap metal recycling will include transport and energy, which have not increased at the same rate.

Without more comprehensive and up to date data, it is difficult to estimate the marginal economic costs of using recycled steel compared to primary steel. However, recycling costs are likely to have remained low, and cost competitive, as evidence by the relatively high amount of recycled content in Australian recycled steel.

On the balance of the above evidence, the incremental costs are likely to be minimal. This review of the above data on costs and emissions from steel recycling supports the use of the central cost estimate used in the CBA (i.e. that costs will be higher than the level of current incentives, such as the carbon price, but lower than the externality benefit).

It is worth noting that recycled or reused steel is not a perfect substitute for primary steel as the quality and load-bearing performances vary. However, IS Rating users report that the ratings process has encouraged greater use of recycled steel in applications where this is appropriate.

A.2 Cement

Together, cement and steel account for significant proportion of CO_2-e emissions at about 6 and 6-8 per cent of industrial and power sector emissions respectively (Bataille, 2019).

Sustainable cement has about 70-75 per cent of the embodied CO_2-e emissions of conventional (‘Portland’) cement (Boral, 2014). Bataille (2019) suggests that some process changes for clinker substitution to produce low carbon cement do not have substantial financial costs, while Beyond Zero Emissions (2017) report that there are low carbon alternatives to Portland cement at similar costs and with no loss of performance.

As with steel, the literature on cement also suggests that low carbon substitutes are available at similar costs. However, unlike steel, some sources suggest that market prices for sustainable cement can attract a small price premium of around 10-15 per cent (e.g. refer to Beyond Zero Emissions, 2017). ISC notes that this price premium could be attributable to a short-term shortage of sustainable cement supplies required to supply the large demand from government infrastructure projects with sustainable procurement commitments.

A.3 Implications for the CBA

The desktop review on recycled steel and low carbon cement suggests that sustainable alternatives to these two construction materials, which can account for a very large proportion of the carbon footprint of infrastructure, are available and delivered by the market at either a similar or marginally higher cost.

The lack of more accurate estimates reflects an apparent gap in the literature on these topics. However, it is worth noting that recycled steel and cement are being delivered by the market with no apparent government subsidies, reinforcing their likely cost competitiveness with conventional materials.

Increasing the use of these materials even further will likely come at a marginally higher cost in the form of higher transport costs, because more of the feedstock (i.e. waste for clinker substitution or scrap steel for steel production) will need to be transported from greater distances.

This review supports the use of the central assumption in the CBA (i.e. that incremental costs of sustainability improvements are 25 per cent into the range of plausible values between current financial incentive and the full externality benefit). This is also consistent with published abatement cost data. For example, beyond low carbon material inputs, various studies have shown that low cost abatement opportunities (i.e. between 0 – 25 per cent of externality values) are available across the land use, energy and water sectors (e.g. refer to Energetics, 2016; ACIL Allen Consulting, 2015 etc.).

While the CBA uses a cost assumption of 25 per cent into the financial incentive-externality benefit range, there is uncertainty around this assumption. To acknowledge this, the CBA also applies a sensitivity test of costs being 50 per cent into the range. The economic cost premium of using sustainable materials and other sustainable improvements should be further investigated as part of future work.

Appendix B Peer review of draft results

ISC commissioned The Centre for Independent Economics (The CIE), an independent economics consultancy, to conduct a peer review of the draft methodology and results from this study. The CIE peer review is included below.

The CIE review commented on the:

- overall approach used in the study
- establishment of the base case
- types of costs and benefits measured
- measurement of impacts
- valuation of impacts.

The review supported the use of a CBA framework to evaluate the value of IS Ratings to society and agreed with the overall methodological steps and logic used to conduct the CBA.

The review mainly recommended providing greater evidence on incremental improvements delivered by IS Ratings, and the approach used to estimate improvement costs. The review also requested some minor clarification on cost and benefit assumptions.

In response to the review, the analysis and report were updated by:

- requesting more information from stakeholders on the hypothetical base case or counterfactual (i.e. the without IS Ratings case), the types of improvements implemented and the costs of improvements[12]
- conducting further desktop research on improvements costs
- updating cost and benefit assumptions
- updating the report with the revised assumptions and results
- providing more detail on some assumptions.

The full peer review is provided below.

[12] These remain focus areas for future data collection / research as stakeholders were only able to provide some opinions on the likely outcomes in the base case and cost data is generally not being collected.

IS Rating Return on Investment — CIE peer review

RPS Group has conducted a cost benefit analysis (CBA) of the Infrastructure Sustainability Rating. The CIE has been asked to undertake a high level peer review of the methodology used. The document reviewed is version 4.0. No review has been undertaken of the CBA model or spreadsheets. This briefing sets out the conclusions of the peer review and some potential areas to strengthen the CBA.

Overall approach used in the study

RPS Group has used a cost benefit analysis framework to assess the value of the IS Rating. This is the standard tool for evaluating policy interventions, and if the purpose is to evaluate the overall value of the IS Rating tool to society then this is the appropriate tool to apply to evaluate the IS Rating.

The report clearly outlines the steps required to do a CBA of ISC and the logic is well set out and easy to follow.

The key steps in a cost benefit analysis are set out in box 1.5. The CIE has aligned our review broadly to these key steps.

- **Establishing the base case** against which to assess the potential socioeconomic and environmental impacts of changes. For the IS Rating, the base case is that the IS Rating tool was not available for infrastructure projects to use.
- **Quantifying the changes** from the base case resulting from the possible scenarios being considered. This should focus on the incremental changes to economic welfare resulting from the decision. The changes may be known with certainty or could also be defined in probabilistic terms. The quantification should focus on key changes that will be utilised in the valuation stage.
- **Placing values on the changes** and aggregating these values in a consistent manner to assess the outcomes.
- **Generating the Net Present Value (NPV) of the future net benefits stream**, using an appropriate discount rate.
- **Undertaking sensitivity analysis** on a key range of variables, given the uncertainties related to specific benefits and costs, especially willingness to pay.

Establishing the base case

The costs and benefits of the IS Rating are measured relative to what would have occurred had the tool not been available. This is not readily observable.

Establishing the base case is quite difficult as projects may undertake sustainability activities without the IS Rating.

The approach used in the CBA is to use the BAU defined with the IS Rating tool as the base case. This is set out in details in the ISC Technical Manual.

> A base case should be chosen that is a suitable, early design accepted by key stakeholders as being representative of the original concept for the infrastructure development. The design should be advanced enough to provide sufficient details, such as a bill of quantities, from which footprints can be calculated and, ideally where business-as-usual (BAU) technologies can be identified. This might be a concept design or a reference design which is used for tendering purposes. [1]

The ISC Technical Manual notes that the base case should reflect technologies that are recent, used for similar purposes and in similar locations.

The use of the ISC BAU will capture a difference between the sustainability outcomes of the project and a base case. The implicit assumption is that this entire difference is because of the use of the IS Rating tool — that is, the project would not otherwise have sought to go above BAU if it was not using the IS Rating.

The CBA report notes that using this as the baseline may overstate impacts if sustainability leaders are those doing ISC and they would have done something more than BAU anyway. The Phase 2 findings also suggest that only a part of the difference to BAU is really due to ISC itself, as it is not primarily viewed as a decision-making tool. This suggests some adjustment could be made about how much of the impact is attributed to obtaining an IS Rating.

I note that it is often very difficult to tease out causality from a program like ISC, so this is not an easy task, and any assumption will be somewhat arbitrary.

The report includes useful commentary about the findings being most relevant to projects that are operating at BAU and may be less applicable to sustainability leaders.

Types of costs and benefits measured

The CBA measures the following costs and benefits:

- GHG emissions reductions from reduced energy consumption, water consumption and material use
- Air pollution reductions
- Improvement in ecological values
- ISC administration costs
- Cost of obtaining ratings
- Cost of achieving improvements in sustainability.

1 ISC 2018, Technical Manual 1.2, https://www.ISC.org.au/getmedia/0bbf4395-1a27-490c-bfdc-3789aa091af8/ISTechnicalManual_v1-2_Nov18.pdf.aspx.

Based on the ISC Technical Manual, the IS Rating tool requires projects to consider many more issues that only GHG emissions, air pollution and ecological value (chart 1).

1 IS Rating Scheme Framework

Themes	Categories	Abbreviation
Management & Governance	Management Systems	Man
	Procurement & Purchasing	Pro
	Climate Change Adaptation	Cli
Using Resources	Energy & Carbon	Ene
	Water	Wat
	Materials	Mat
Emissions, Pollution & Waste	Discharges to Air, Land & Water	Dis
	Land	Lan
	Waste	Was
Ecology	Ecology	Eco
People & Place	Community Health, Wellbeing & Safety	Hea
	Heritage	Her
	Stakeholder Participation	Sta
	Urban & Landscape Design	Urb
Innovation	Innovation	Inn

Data source: ISC 2018, Technical Manual 1.2, https://www.ISC.org.au/getmedia/0bbf4395-1a27-490c-bfdc-3789aa091af8/ISTechnicalManual_v1-2_Nov18.pdf.aspx, Figure D.

This may mean that there are some impacts of the IS Rating tool that are not being measured, while the full costs of obtaining a rating are being measured.

The CBA notes that there are unquantified impacts. It would be useful to expand the discussion of what changes in behaviour IS Ratings leads to, so that there is a fuller documentation of the type of impacts and which of these can be quantified.

Measuring the impacts

The GHG emissions impacts are stated as being measured by using information directly reported in the IS Rating tool for changes in energy consumption and material use. I have not seen the database to confirm this. If there are any assumptions to convert material use to GHG emissions then this should be included.

The water impacts are measured by using information directly reported in the IS Rating tool, as savings in kL of water. A GHG impact per unit of water is used of 1 tonne of Co2e per ML of water. This is based on average GHG emissions across water utilities per unit of water.

For air emissions and ecological values, assumptions are made about what different scores represent, to give percentage improvements. It is not clear on what basis these assumptions are made. To get to actual changes in air emissions, the percentage impact would need to be multiplied by some level impact. I am not sure what the level impact is base on.

It would be useful to provide greater clarity on the time path of the impacts. I believe some impacts would have already occurred, and some will occur in the future.

It would also be useful to clarify why the time period of 2020 to 2040 has been used. If some impacts have already occurred, these should be included. If the project lives are longer than 20 years, and impacts are persistent, then a longer period could be used.

It would also be useful to state whether the CBA measures the impacts only for projects that have already been rated, or whether it extrapolates to future ratings as well. A chart showing the costs and benefits over time would assist in this.

If there is information on what projects are specifically doing to achieve improved environmental performance then that would also be helpful context for the CBA.

Valuing the impacts

Valuing the benefits

The benefits that are valued are GHG emission reductions, air emissions reductions and improved ecological outcomes. GHG emission reductions are from reduced energy use, reduced material use and reduced water use.

Valuing GHG emission reduction

The analysis uses a value of $45.60 per tonne CO2e.

There are various approaches in the literature to valuing GHG abatement benefits, including the following:

- Social cost of carbon (SCC) approach — this is a measure of the discounted value of expected future global damages from additional GHG emissions.[2] SCC estimates are generally based on modelling of future climate change impacts and their economic effects. Given the large uncertainties around the impacts of climate change, estimates of the SCC can vary significantly.
- Mitigation/abatement cost approach — under this approach, GHG emissions are valued using a carbon price measure, on the basis that a carbon price reflects the marginal cost of abatement. The price used to value carbon emissions could be an existing traded price, such as the EU Emissions Trading Scheme (ETS) price. Alternatively, several Australian studies value the reduction in greenhouse gas emissions using the projected carbon price from various carbon price modelling exercises (alternatively, projected future energy prices including the carbon price are used as the energy price, which also captures the value of the greenhouse gas externality).

The United States (US) Government's Interagency Working Group (IWG) on Social Cost of Greenhouse Gases revised its estimates of the social cost of carbon for Regulatory Impact Analysis in August 2016.[3] To generate these estimates, the IWG generated a frequency

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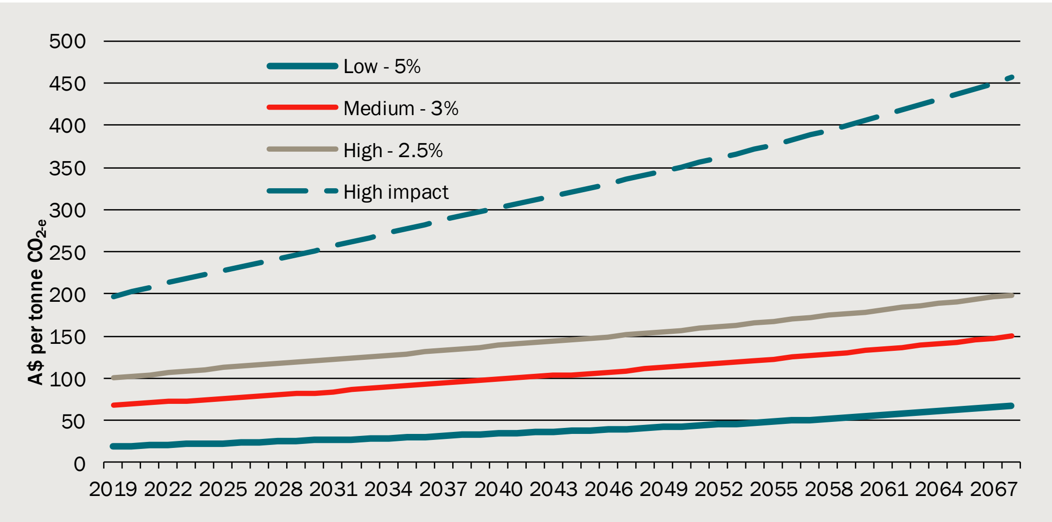
[2] Jotzo, F., Pezzey, J., van Dijk, J. and Mazouz, S. 2015, *Social cost of carbon for NSW policy analysis*, prepared for the NSW Department of Environment and Heritage, p. 9.

[3] US EPA 2017, *The Social Cost of Carbon: Estimating the Benefit of Reducing Greenhouse Gas Emissions*, https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html.

distribution for the future costs of climate change per tonne of $CO_{2\text{-e}}$ based on climate modelling. Chart B.12 shows these estimates in Australian dollars:

- The low scenario, discounts the average estimate of the future costs of climate change, using a discount rate of 5 per cent.
- The medium scenario discounts the average estimate of the future costs of climate change, using a discount rate of 3 per cent.
- The high scenario discounts the average estimate of the future costs of climate change, using a discount rate of 2.5 per cent.
- The high impact scenario corresponds to the 95th percentile of the frequency distribution of the future costs of climate change, using a discount rate of 3 per cent.



Data source: US EPA 2017, *The Social Cost of Carbon: Estimating the Benefit of Reducing Greenhouse Gas Emissions*, https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html.

The NSW Government suggests using a market price[4], such as the EU market price for carbon from future markets.[5] The current price is 25 Euro per tonne, or around A$40 per tonne.

The value applied in the CBA is within the range of values provided by US EPA and the EU carbon trading market.

Valuing air emissions reductions

Air emissions reductions are stated as focusing on particulate matter, applying to construction and using a cost of ~$200,000 per tonne of PM2.5.

The data used to obtain the base level of PM2.5 per $m of capital expenditure has not been set out in detail. The statement suggests that this uses PM2.5 from total construction. The study used focuses on non-road diesel engines, which may not be relevant for the CBA.

4 https://www.treasury.nsw.gov.au/sites/default/files/2017-03/TPP17-03%20NSW%20Government%20Guide%20to%20Cost-Benefit%20Analysis%20-%20pdf_0.pdf

5 https://www.planning.nsw.gov.au/-/media/Files/DPE/Other/technical-notes-supporting-the-guidelines-for-the-economic-assessment-of-mining-and-coal-seam-gas-proposals-2018-04-27.pdf?la=en

I couldn't see the $200,000 per tonne of PM2.5 in the reference provided. A damage cost of that order of magnitude is consistent with other work I have seen on damage costs.[6] The reference may need updating, as this may be to environmental appendices for the mining and coal seam gas guidelines that have now been updated and released.

Valuing ecological outcomes

The value of ecological outcomes is estimated by applying the percentage reduction fo a baseline of $700,000 per infrastructure project. Further transparency would be useful about how the baseline ecological value is estimated. It appears to be based on biodiversity offsets, but it is not clear if this is for the specific projects that have IS Ratings or some other set of projects.

Estimating costs

The costs comprise the cost to get a rating and to administer a rating, and the cost of undertaking activities that improve sustainability.

Cost of a rating and administration

The cost of obtaining a rating is based on a single project, assessed in a previous study. The CBA study should seek information from those using the IS Rating tool about how much time and other costs are incurred to use the tool.

It is currently not clear if there is some overlap between the costs of administering and the ratings cost. The ratings cost includes effort for ISC to approve a rating. This may also be included in the administration cost for ISC.

It would also be useful to detail the cost profile over time, and to indicate whether there are costs of getting re-rated that are required to achieve the benefits estimated.

Cost of improving performance

The CBA includes a net cost of improving sustainability performance. The net cost comprises the cost of any activities that improve performance, less any financial benefits, such as reduced energy costs, material costs, water costs, biodiversity offset costs and any other cost reductions.

The net cost of undertaking activities that improve performance has not been measured directly in the CBA, but is assumed, on the basis that:

- a project would take account of financial costs in the base case, but would not take account of social costs, and
- a project would take account of financial costs and social costs if it does an IS Rating.

For the different types of externalities measured (GHG emissions, air pollution and ecological value), the CBA report states that some part of the impact is incorporated into financial costs. It needs to be articulated what part if taken into account within financial incentives. For example, given that ecological values are based off biodiversity offsets, does this mean that all ecological value is already taken into account in the base case?

6 https://www.epa.nsw.gov.au/~/media/EPA/Corporate%20Site/resources/air/HealthPartEmiss.ashx

To estimate a net cost of achieving the sustainability improvement, what is called 'the improvement cost', the CBA assumes that the costs are 25 per cent of the difference between what is financially incentivised and the social value of the changes.

Measuring costs in this way has the advantage that it can be broadly applied. However, it presupposes the outcome that the CBA is seeking to measure, because costs of achieving changes are assumed to be a proportion of benefits. It also assumes that the incentives in infrastructure decision-making operate fairly rationally based on either financial incentives or social incentives, and with information available. Infrastructure decision-making is complicated and likely to not operate in such a rational way in many instances. Further, the reason for having ISC potentially relates to addressing information gaps. This would also mean that it could not be assumed that projects were acting rationally in the base case.

It would be useful to more directly measure the costs and cost savings to projects of achieving sustainability performance above BAU. This could be done through some case studies, which could then be generalised to a cost assumption to apply across all projects. (Note that this would have to consider cost savings such as reduced energy costs, which are currently not explicit.) It may be that for some proponents there is no net improvement cost, and for others this is much higher than the social value generated.

Alternatively, if information on what activities are being undertaken is available from the projects, then the CBA could look at evidence of returns from such activities in other contexts, and apply this to the infrastructure projects. This would only work if the activities are relatively standard, such as replacing lighting types.