Ecological impact assessment and roading projects:

thoughts from a Transport Agency project team

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There are common challenges associated with undertaking ecological impact assessments (EcIA) relevant to all sorts of different types of projects, large and small. Challenges include:

- availability of relevant data such as species distribution;
- understanding of complex ecological processes, and
- ecological assessments having to fit within project timeframes and still produce meaningful data (Treweek, 1999).

This article touches on several challenges experienced by New Zealand Transport Agency (Transport Agency) project teams when constructing new roads. Some of these challenges are unique to large road construction projects and other challenges may be experienced by other project types; however, because of their size and nature, they are likely to be more complex on road projects. A number of Transport Agency planners and project managers as well as ecological consultants who have worked on Transport Agency projects were asked for their thoughts regarding challenges associated with EcIA and their feedback provides the basis for this article.

Good information early on in project development

In the planning stages of a new road construction project there are often several different options for the route alignment and/or design. The Transport Agency undertakes an options assessment ("optioneering") where risks and opportunities associated with each option are identified and the merits of each explored and compared. The purpose of the assessment is to come up with a short-list of options that will undergo more in-depth investigations so a 'preferred option' can be chosen. For Transport Agency projects, EcIA starts at the options stage and a key challenge is for project teams to have adequate ecological information available at early and meaningful stages of project development. Good information enables the project team to make informed, robust decisions about ecological features that could be potentially affected, and how to manage effects on them. Theoretically, the earlier in the project development process accurate ecological information is received, the more likely it is that the project team can apply this knowledge when planning the route alignment, enabling the project to avoid high ecological values. The team also knows early in project development whether there is mitigation that should be designed in. It is especially important that the need for any large and/or expensive mitigation interventions be flagged as early as possible so these can be adequately factored into project design and budget.

So, at the early stages of project development there is a greater opportunity to influence the design while the project is flexible enough to allow for changes to the route alignment and construction methodologies. However, generally the level of detail in an EcIA increases as the project evolves, and through the options assessment process, the study area for EcIA becomes more focused. Here is the conundrum: where ideally at the options assessment stage there would be as much information available to the project team as possible, the reality is that there is often little desktop information available and it is not feasible to undertake detailed site investigations early on when a lot of options are on the table. For example, there were 24 different route options for one project recently. While overseas there is increasing use of geographical information systems and modelling in environmental impact assessments for highways (e.g. Banerjee et al., 2016) the Transport Agency relies on the technical expertise and regulatory knowledge of their ecologists to address this issue. A national comprehensive database showing the distribution of abiotic and biotic variables would help address this challenge considerably in that it could be used to inform the Transport Agency's 'Environmental and social responsibility screen' that is applied early in project development to help inform option assessment.

Lack of quantitative information regarding ecological effects of roads

Globally, 'road ecology' has become a recognised specialist discipline, defined as "*using the science of ecology and landscape ecology to examine, understand, and address the interactions of roads and vehicles with their surrounding environment"* (Forman, 2003). There is much international research directed to understanding how roads are affecting both terrestrial and aquatic ecosystems and species (e.g. Seilers, 2001; Spellerberg, 1998). Road ecology in New Zealand is in its infancy and currently there is little science on how roads may be affecting New Zealand's ecology; there are many knowledge gaps. Coupled with little scientific research on roads and ecology in New Zealand, is a lack of relevant data available to the project ecologist as touched on in the previous section.

While there is considerable reliance on the ecologist to provide accurate and expert technical advice, often decisions are made based on their expert opinion and experience, with limited scientific understanding of many of the species and habitats involved to support their conclusions. In addition there may be constraints on obtaining site-specific data (e.g. one season's field data only available to support assumptions). While lack of quantitative information is not unique to road projects, it can be particularly challenging when dealing with large, linear, complex projects that can have numerous direct and indirect effects. The ability to address large knowledge gaps is constrained by intense, short programme timeframes. Among other constraints, generally the timeframe for projects does not allow for robust scientific design in EcIAs, thereby introducing a reasonable degree of uncertainty in EcIA predications and effects management strategies. The issue of there being a gulf between assessment techniques used for EcIA and those researched and promoted in scientific literature is well known, (e.g. Treweek, 1999) and is being grappled with internationally (e.g. Karlson et al. 2014). Attempts are being made to bridge this gulf overseas with quantitative methods being put forward that can be incorporated into challenging project timeframes (e.g. Berthinussen and Altringhan, 2015).

The Transport Agency has started the ball rolling in New Zealand with their research into effects of roads on native bats and the resulting development of a bat framework (Smith et al., 2017). While this research provides excellent information it also highlights significant gaps in our knowledge that need to be addressed to enable the accurate assessment of the effects of roads on bats in New Zealand and the development of mitigation strategies in which project teams and consenting authorities will have confidence. In future the Transport Agency hopes to incorporate scientifically robust methods and research into projects more

frequently, and enable quantitative information on effects and ways to minimise adverse effects to be utilised for better ecological outcomes.

Accessing land for site investigations

Roads by their nature are linear and a new road project may affect hectares of land, running for kilometres across numerous land cover types and affecting multiple property owners. The ability to access all the land that the project may affect in order to undertake onsite ecological investigations can be a real challenge. Some landowners may not allow access and the Transport Agency may not be able to gain it until close to the time construction begins. This means that the EcIA may be limited to desktop assessments and viewing the site from afar for part of the project footprint/ zone of influence. In this situation the Transport Agency assesses a representative area and relies on their ecologists to apply their professional judgement and give recommendations. There is a risk that something will be missed in the initial EcIA and be discovered once access is granted that could result in programme and delay issues for the project.

Competence

The Transport Agency relies on their ecologists for an appropriate EcIA approach and accurate information. They endeavour to engage ecologists with the right level of competency so the Transport Agency can have confidence in what they are being advised. It is expected the project ecologist will produce an EcIA that helps the project team make the right decisions, applying an approach where the level of effort to undertake the EcIA suits the level of complexity of the project (the EcIA is 'fit-for-purpose'). A competent ecologist with strong road project experience will know what is needed to produce an EcIA that adequately addresses ecological effects that meet both statutory and the Transport Agency's corporate obligations. They will also ensure the EcIA is such that it can inform future monitoring requirements and effects management strategies.

Road ecology has become a discipline in its own right because roading projects have their own quirks and are complex in nature, both from the intense dynamics of a large multidisciplinary team consenting and building a road, and also the many ways roads can affect ecology (e.g. Forman, et al, 2003 ; van der Ree et al., 2015). As mentioned earlier, 'road ecology' is in its infancy in New Zealand and a particular challenge across several projects is for the Transport Agency to recognise not all ecologists have the depth of knowledge on how road projects are planned, designed and implemented, and their effects, to ultimately provide the information required to design, construct and operate a road while minimising ecological effects. For example, the ecologist needs to have the experience to work efficiently with other technical disciplines that are involved on road projects and understand other influencing factors that may need to be worked through before a feasible solution is found.

Communication

The one common challenge that the planners, ecologists and project managers raised when discussing challenges with EcIA was that of communication. It was felt there were communication barriers on both sides hindering the ecologist being able to relay their results and recommendations in a way that the rest of the project team could understand. Disconnect between different disciplines can result in different parties considering that others are not open to new ideas. From the ecologist's point of view, there appears to be a general lack of understanding from planners and the legal team that there are actions *beyond the requirements of the RMA* that the Transport Agency may need to carry out to address the

loss of indigenous biodiversity in New Zealand, and that recommendations put forward are not gold-plated or just 'nice to have'. While these actions can help to get a project consented as efficiently as possible they are put forward to minimise risk to indigenous biodiversity. Some matters may be addressed by legislation other than the RMA, such as the Wildlife Act 1953. The appropriate level of effort required when managing effects is often debated between ecologists, planners and project managers.

From a project manager's perspective, there have been risks and delays from misunderstanding the implications of what the ecologist has reported in their EcIA. There is the need for ecologists to explain the reasons behind their assessments more effectively and to provide data that can be readily interpreted by their non-ecologist audience as well as other ecologists. Greater understanding from the project team would likely ensure more support for the recommendations and result in less risk to the project. The non-expert needs to 'get' the reasons behind the recommendations both from a technical and statutory point of view. EcIAs and any subsequent ecological management plans need to be future-proofed and written in a way that makes sense to planners and project managers involved in project development and consenting. They also need to be very clear about the design and mitigation intentions for the team involved in constructing, operating and maintaining the new road (e.g. van der Ree et al., 2015).

Conclusion

The Transport Agency is a large government organisation whose primary function is to promote an affordable, integrated, safe, responsive and sustainable land transport system. There can be significant ecological effects when constructing roads and the Transport Agency takes this seriously, with ecological impact assessment being considered from early in project development through to operation and maintenance phases. There are big challenges associated with constructing roads and EcIA, some of which are unique to road projects. The Transport Agency is endeavouring to address some of these challenges from different angles including undertaking research and developing supporting guidelines. However, a collaborative effort across different organisations is needed to truly address the common issues experienced when undertaking EcIAs.

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