

NATURE GROUP'S RESPONSE TO THE CRL PHASE II EIA

This paper summarizes our perspectives of our engagement with LTA over the Environment Impact Assessment (EIA) of the proposed Cross Island Line (CRL). We have responded to LTA's overtures to engage us in this dialogue with one primary principle – to protect the integrity and viability of habitats and species within the Central Catchment Nature Reserve (CCNR). In order to ensure this, we had two objectives:

- articulate our concerns about the potential ecological impact from construction and operational activities of the proposed line; and
- provide inputs to LTA on measures that need to be undertaken to mitigate such impact.

Our concerns were focussed on the proposed Alignment Option 1 which, if implemented, will pass under the CCNR with a worksite close to Windsor Nature Park (WNP). Here, we voiced our concerns on the potential ecological impact over two specific areas:

- The protected forest under which the proposed Alignment Option 1 will run;
- The worksites outside but adjacent to the CCNR and WNP.

Our engagement with LTA has also surfaced concerns over several broader issues:

- Impact assessment methodology;
- Coping with unforeseen and unplanned events;
- The fragility of our forest ecosystem.

We conclude with a nuanced position on the key findings and recommendation of the EIA. We will also share some of the lessons learnt in our engagement with LTA in the conclusion.

SPECIFIC CONCERNS

Soil stability

We were initially troubled by a nightmare scenario of sinkholes in the forest within the CCNR as a result of tunnelling work underneath it. However, as there is no engineering expertise among us to question and challenge the working assumptions behind the proposed tunnelling work, we pressed LTA for an independent oversight on those engineering issues that can potentially lead to mishaps with serious if not disastrous impact on the nature reserve. LTA responded positively by assembling an Independent Panel of Advisors (IPA) comprising local and foreign engineering experts. We are now satisfied that the LTA engineering plans have been scrutinized by the IPA. We have been further reassured by the LTA's decision to tunnel through bedrock at deeper-than-usual depths for the entire length of alignment below the CCNR if the government decides to proceed with Alignment Option 1.

Vibration

We were unsure if vibration caused by TBM operation would affect the survivability of animals, especially invertebrates, in the CCNR. In response to our concerns, LTA commissioned extra studies and independent assessments by third-party specialists of the baseline (ambient) vibration environment within the CCNR, as well as for prediction of surface vibration due to TBM operation. We are reassured that some of these studies have been independently corroborated by Mr Tony O'Dempsey. We accept the finding that vibrations caused by the TBM will not exceed ambient levels,

and in any case, vibration will be localized and transient in nature. Nevertheless, it remains critical to be vigilant and monitor vibration closely and constantly if engineering work proceeds underneath the CCNR.

Hydrology

We were initially concerned that tunnelling operations could result in drawing down surface water resources and lowering the water tables supporting forest habitats. These concerns have since been thoroughly investigated and sufficiently mitigated.

Slope Stability

Our previous concerns about the stability of the steep slopes of the Sime Stream valley have also been addressed to our satisfaction.

Work sites

Although it was reassuring to know that construction work would not be carried out within the forested surface area in the CCNR, we remained concerned that construction activities adjacent to the CCNR and WNP would still have a spill-over effect on the nature areas. It is therefore gratifying to know that these concerns have been acknowledged by LTA and reflected in the final versions of the EIA.

One of the issues originates from forest clearing and habitat loss at the worksites. Although these problems can be mitigated through post-project reforestation, we felt that it would not have the immediate benefits of habitat replacement and should not be presented as such. We are therefore glad that this concern has been registered and the impact magnitude was revised upwards in the EIA.

The other issue revolves around the how the A1-W1 site would impinge upon the connectivity for animals between a 10-hectare forest patch and Windsor Nature Park. Due to the nature of forest edge and canopy proximity across Island Club Road, the area is an important corridor for cursorial and arboreal mammals that utilise both sides of Island Club Road for shelter and foraging. Our dialogue with LTA has led LTA to accept the need to minimise the working area of A1-W1, and to agree, in principle, to relocate non-site-dependent equipment and facilities to less sensitive areas away from A1-W1. It is also emphasised that moving A1-W1 partially or fully into the SICC land would be a more preferable option if that could be possible. The assurances of their intentions have now been inscribed in the EIA, but details cannot be worked out until the Advanced Engineering Phase. This and other related unresolved issues will remain a concern that will be elaborated in our conclusion.

Meanwhile, we are pleased that LTA has recognised the potential problem that the worksite A1-W1 will pose for the movement of the Raffles Banded Langur in the vicinities. We applaud LTA's decision to commission an extra study by primatologist Dr Andie Ang to identify potential crossing locations and recommend measures that would maintain the connectivity.

BROADER CONCERNS

Impact assessment methodology

While acknowledging that there is no universally accepted methodology in measuring impact magnitude and assessing impact significance, we cannot avoid the impression that the ERM Impact Significance Matrix has elements that seem arbitrary and subjective in assessing impact magnitude. Perhaps this is to some extent inherent in assigning risk via such matrices, perhaps there could be a summary table that explains comparative risk (such as to wildlife) for the two alignment options in prose form, to augment the respective risk matrices.

There are also some inherent blind spots which tend to downplay impact magnitude (and therefore impact significance) of ecologically disastrous events in our forests (with the exception of events such as forest stream contamination). If nothing elsewhere, the methodology tends to force us to choose stark categories with no room for refinement in between.

What is more worrying is that there are no common standards for Singapore. Different EIA and EIS conducted in Singapore have relied on different criteria. There is clearly a need for higher-level regulation of this process.

Unforeseen eventualities

We are glad that the EIA has identified seven scenarios that can happen, with all the operational plans and engineering designs to minimize the risks. It is also reassuring that response plans are in place to cope with such eventualities. However, there remain three critical uncertainties:

- The rigour and vigilance of monitoring of all early warning indicators.
- The timeliness of remedial responses, along with the availability of necessary resources and familiarity of the response teams of the procedures to cope with any contingency.
- The “unknown unknowns”. For every project there will be unanticipated impacts no matter how diligent or rigorous the impact assessment has been. The unexpectedly high faunal mortality rate as roadkill during construction along Mandai Lake Road for the Mandai Rainforest Park project is a case in point.

CONCLUSION

Ecological fragility of our nature reserves

Our nature reserves are inherently highly vulnerable. They are small, and are fragmented into even smaller constituent patches. Even though NParks has done a commendable job in securing buffer zones in the form of nature parks to insulate the reserves from the urban sprawl, a lot more is required to make the reserves less susceptible to the encroaching effects. Such constraints make them vulnerable to physical forces such as wind and drought, and human impacts such as roads, noise, and lights. Recreational activities and poaching strain the long-term viability of our reserves by creating stresses which at some point could severely hinder the survival of some of the wildlife species. To these already stressed nature reserves we now add additional human impacts through various projects such as CRL construction and operations, PUB pipeline project, solar panels on Upper Pierce Reservoir and Mandai Forest Park project. Even if such construction activities and worker movement occur outside

our nature reserves and nature parks, they can still cause a negative impact on the habitat and the multitude of living organisms they support. Some of these impacts can be serious and irreversible (e.g., contamination of forest streams). In other cases, even if mitigation measures have been put in place, residual impact will still strain the ecosystem with its attendant effects on its flora and fauna. Our concerns are further aggravated by the possibility of unplanned events and other “unknown unknowns”. Even incremental impact can snowball over a period of time to degrade the ecosystem eventually.

Such possibility of accumulative impact requires the attention of the government at the highest level. We would therefore appeal to the government to seriously consider, *a priori*, alternative solutions that can circumvent the need to engage in *any* construction activities within the nature reserves and nature parks and their respective adjacent areas. In this spirit, we would urge the government to recognise the potential ecological impact that may accompany the construction and operation activities of Alignment Option I.

While affirming our reservations concerning the methodology employed in assessing impact significance, we note that even the consultants have acknowledged that residual impacts of works under and near the CCNR is still of “Moderate” significance, i.e., far from being negligible.

While we do not subscribe to the notion that choosing Alignment Option I will lead to massive extinction of wildlife within our nature reserves, we would still urge the government to take a precautionary approach and not to add more strains on the wildlife populations in a habitat that has already been stressed by so many perturbations. However, if the need to address such concerns is outweighed by other broad considerations from the government’s perspective, we would urge the government to build the following safeguards into a final decision if Alignment Option I is chosen:

- The nature community are keen to continue to be engaged and consulted during the Advanced Engineering Phase to resolve all the remaining unsettled issues in the EIA. These include:
 - how the footprint of A1-W1 can be minimized to allow animals unimpeded access through that part of the forest;
 - the design and footprint of waste-water management system near Windsor Nature Park;
 - the design and footprint of A1-W1 including consideration of moving the worksite either partially or fully into the unforested SICC land;
 - the question of whether power for A1-W1 can be taken off the grid and not from power generators on site;
 - representatives of the nature community should be invited in regular audits of worksites to verify full compliance of the Environment Management & Monitoring Plan (EMMP) as outlined in the EIA;
 - The footprint of A1-W1 will be minimized so that animals in that area will still enjoy unimpeded access through the south.
- Comprehensive flora and fauna studies (surveys) should be conducted for the forested areas in and around worksites A1-W1 and A1-W2;

- A system must be in place to ensure that there will be rigorous and vigilant monitoring of all early warning indicators as the project progresses;
- Periodic rehearsals of remedial responses to simulated contingencies should be prescribed in agreements with contractors and subcontractors engaged in engineering work within or adjacent the nature reserves.

This having been said, Alignment II is not without its threats to wildlife, in particular at worksite A2-W3 which is situated within the only forested corridor connecting the Lornie Rainforest fragment with the rest of the CCNR. We also recognise that there have been insufficient baseline biodiversity studies of the forested worksites of Alignment 2 however limited site visits and mortality records have shown the A2-W3 site and its vicinity to be occupied by fauna of conservation concern, specifically: Sunda Slow Loris, Sunda Pangolin and Malayan Colugo. Due to direct forest connection with the CCNR, there is also a high probability that the site is also occupied or used by other fauna of conservation concern including but not limited to Lesser Mouse Deer and Horsfield's flying squirrel. We would urge the government to build the following safeguards into a final decision if Alignment Option 2 is chosen:

- Comprehensive flora and fauna surveys should be conducted for the forested areas in and around worksites A2-W2 and A2-W3;
- The nature community are keen to continue to be engaged and consulted during the Advanced Engineering Phase to resolve all the remaining unsettled issues. These include:
 - How the footprint and design of A2-W3 can be shaped to avoid removing the larger trees in close proximity to the worksite. Loss of these trees will render the forest corridor dysfunctional for the arboreal fauna;
 - How the footprint of A2-W3 can be minimised and positioned to avoid blocking access through the forest corridor for cursorial fauna;
 - Representatives of the nature community should be invited in regular audits of worksites to verify full compliance of the Environment Management & Monitoring Plan (EMMP) as outlined in the EIA;
- A system must be in place to ensure that there will be rigorous and vigilant monitoring of all early warning indicators as the project progresses;
- Periodic rehearsals of remedial responses to simulated contingencies should be prescribed in agreements with contractors and subcontractors engaged in engineering work within or adjacent the nature reserves;

Potential for compensatory works

Recognising that the assessed residual impacts for either alignment are not negligible, we urge the government to consider compensatory works to offset the effect of impacts. Compensatory works could be considered for the CRL alone or in consideration (and in combination) of other major and highly impactful infrastructure and housing works currently being undertaken in Singapore such as Tengah Forest Town, Mandai Rainforest Park, etc. The nature of compensation works could involve

funding of forest enhancement projects or nature reserve de-fragmentation projects. The nature community is keen to engage with government to discuss the possibilities.

Standards for ecological impact assessments

We realise that our reservations about the impact assessment methodology in this EIA should not be hoisted as an objection to the main conclusions of this particular project. However, we wish to register our concern about the need for higher-level intervention to develop a set of coherent, consistent and rigorous standards for all EIAs in Singapore.

While the nature community understands and accepts that development within the ecologically sensitive areas may sometimes be unavoidable in land-scarce Singapore and painful trade-offs will be necessary, we will still be gravely concerned if construction activities with potential to harm the environment are allowed to proceed without a rigorous EIA process that *must* involve an active and honest consultation with the nature conservation and scientific community.

FUNDAMENTAL ISSUES & LESSONS LEARNT

Mainstreaming biodiversity

While we are appreciative of and satisfied with the substantive and detailed consultation process that we have enjoyed with LTA since 2013, there remains the sense that even more progress can be made in the planning of infrastructure and other projects that may impact Singapore's natural heritage. One principle that might be useful and ultimately more cost-effective, in addition to securing the long-term viability of Singapore's biodiversity, is that of "mainstreaming" biodiversity into master-planning processes.

Singapore is signatory to the Convention on Biological Diversity (CBD), an international convention established in 1992 to protect the world's biodiversity. In 2010, a ten-year Strategic Plan for Biodiversity was established to put in place an overarching framework for biodiversity conservation for the entire United Nations system. Parties to the convention, which includes Singapore, agreed to incorporate the framework into revised national biodiversity strategies and action plans. The Aichi Biodiversity Targets, which cover the 2011-2020 period, help the international community implement the Strategic Plan for Biodiversity. There are twenty targets, grouped into five broad areas. Of these, the Strategic Goal A addresses "the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society." More specifically, Aichi Target 2 states that "by 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems." While Singapore does not have poverty reduction strategies found in larger developing countries, we nonetheless have ambitious infrastructure and development plans and processes. Biodiversity mainstreaming prior to planning would likely result in more effective use of Singapore's creative and technical expertise, and engagement with ecologists and wildlife experts could be done upfront together with development planning. Consultation with nature groups could lead to plans that are biodiversity-friendly and minimise the need to search for mitigation and risk reduction – the potential threats to ecosystems would have already been averted or minimised in the initial project scoping and planning.

Adding Resilience to Nature Reserves

In the spirit of mainstreaming biodiversity in the master-planning processes, a lot more can be achieved if government agencies could involve us in searching for and putting in place long-term safeguards for Singapore's ecosystems and biodiversity. This could include inter-agency and cross-sector planning for ecosystem viability, and also an exploration of possible compensatory land allocation. We hope that it might be possible for land swaps or the provision of strategic open spaces, between agencies and between public and private sectors be considered, if such compensatory measures can enhance long-term resilience of habitats and wildlife populations and communities.

Floral & fauna surveys

For any proposed development projects in or around our nature reserves, government agencies should make it a standard requirement to conduct floral surveys and faunal monitoring before, during and after a project, as we have proposed in the earlier paragraphs for the worksites on both alignment options. Such surveys could provide all parties (developers, EIA consultants and the nature community) the database for early warning of unexpected problems, quantify impacts, and measure the effectiveness of mitigation measures to help future projects. Faunal monitoring programmes should be designed with clearly defined objectives and methodology rooted in sound scientific and ecological principles towards the stipulated goals. The cost and scale of such programmes should be commensurate with an *a priori* assessment of the potential risks.

Engagement process with LTA

We would like to acknowledge that LTA has taken the trouble to consult us in good faith. It has not been a perfunctory exercise. We appreciate in particular the 3+1 deep dive sessions hosted by LTA to address the three areas that were of greatest concern to us:

- Habitat Loss at the worksites
- Impact of tunnelling on hydrology and slope stability
- Vibration impacts due to operation of TBM

The sessions have been constructive because they were conducted in the spirit of mutual respect. We have learnt to hear each other out, and we are glad that many of our inputs have been accepted and incorporated in the EIA. It has been a mutually useful journey and has served our respective interests well.

This document is an attempt to summarize the general views of the seven interlocutors engaged by LTA on the Phase II EIA consultation. As we are not a monolithic group, individuals were invited to express their reservations or disagreements, in part or in toto, and append their own comments if they wish to add more emphases on certain points, or downplay other points. Their views have been incorporated in the Remarks column of the finalized version.

Name	Remarks
Vilma D’Rozario	(Agreed but proviso.) I am still not comfortable with having the MRT line running under the forest albeit far beneath the nature reserve and in hard rock. In principle, I strongly feel that this is an infringement of the nature reserve. Related to this, I strongly feel that any development under the nature reserve will set a precedent for more development under our nature reserves in the future. And we should not take the risk.
Joseph K H Koh	(Agreed.) I applaud this holistic approach. This offers more than just a nuanced and balanced commentary of the key EIA conclusions; more importantly, it has registered the over-riding importance of factoring in biodiversity conservation (including compensatory reforestation) at the inter-agency and master-planning process. I am fairly confident that our top decision-makers will take note of the reasonable, fact-based, intellectually honest position that we have taken. With this, I hope that they will be further encouraged to deepen their engagement and consultation with the nature community.
Leong Kwok Peng	(Agreed.) The narrative for compensation of the CRL worksites involving the removal of forested area should be granted in areas not related to the downgrading of Lornie Road. This narrative I believe have been taken up by the construction of the new Lornie Highway cutting across Bukit Brown. Compensatory works should be considered elsewhere.
Norman Lim T-Lon	(Agreed.) The measurement of velocity covers a broad range of frequencies (there was a slide on this during the Deep-dive session, and I cannot recall the range of frequencies). Yet our current (limited) understanding of sensory ecology generally goes by frequency (e.g., spiders respond to vibrations above certain magnitude at 50 Hz, as a hypothetical example). Even if the overall velocity (which is measured across this huge frequency range) is low (e.g., TBM, and still lower than background velocity measurements), it may have been concentrated at the frequency that is relevant to that species (e.g., exceeds that threshold at 50 Hz for that spider). Thus, the use of velocities as a unit of measurement may not be the most biologically appropriate for impacts to fauna. Thus, I would like to see a stronger and explicit acknowledgement that 1) much is unknown about wildlife’s response to noise and vibrations, and 2) the importance of quantifying noise/sound

	by frequency (and not only quantified via velocity mm/sec), but current monitoring methods are unable to do such quantification.
Zac Lim Zhizhao	(Agreed.) I would like to add that a direct alignment may be pragmatically impeding in the long run as it limits our options in evolving the national rail network in the future. In our current situation, SIW was possible with impact much reduced because it happens to be along Sime trail. Other than that, SIW option within the reserve is actually really limited coupled with potential ecological concerns. On the other hand, the skirting alignment will not have this issue and thus allowing us more flexibility in future planning or enhancement of the network.
Shawn Lum	(Main author -- Not applicable)
Marcus Chua	(Agreed.) Although it is already present in the document, I would like to emphasise that the less than satisfactory EIA methodology and lack of clear standards that are relevant to the Singapore context is a concern for me regarding the decisions that could be made based on the findings. Some aspects of impacts of both alignment remain unknown (e.g., short and long term impact of worksites on the environment) and should be better studied. However, I am glad that throughout the process, LTA has been keen to explore various mitigation measures for possible problems that were surfaced, and that has been reflected in the Phase II EIA.
Sivasothi N	(Agreed.) The requests expressed are in keeping with what this LTA team seems keen on. I think we can see them as an ally in facilitating adoption of such practises by other agencies who may need the help. And this is well in keeping with the next PM's expressed objective of engagement.
Subaraj Rajathurai	[Subaraj was not able to provide additional comments in this document by the time this was sent out.]