1 PURPOSE

Each launch (mission trajectory) is unique and subject to each launch vehicle, client, payload objectives, fuel type and environmental conditions.

The ELA mission optimisation process manages the ambiguity of each launch, taking into account public safety, environmental constraints, recovery areas, and unique mission constraints, is detailed below.

2 BACKGROUND

1. Flight Safety is primarily concerned with the risk that the launch vehicle departs from its planned trajectory and/or breaks up in flight, causing debris to fall outside planned impact areas.
2. The objective of Flight Safety is to protect the public, personnel and property during launch operations.
3. Launch campaigns and missions are planned and executed such that Flight Safety risks are controlled to acceptable levels while enabling missions to obtain their objectives.
4. The Australian Launch Permit (ALP) application process includes the preparation of a Flight Safety Plan which describes the proposed launch vehicle flight path and the means to conduct the operation safely.
5. To support the ALP and Flight Safety Plan, a Risk Hazard Analysis (RHA) is conducted by a Suitably Qualified Expert (SQE) to identify potential hazards during launches or returns that may cause harm to public health and safety as well as to critical assets.

3 TRAJECTORY OPTIMISATION AND SELECTION PROCESS

To determine the optimal launch trajectory, an iterative analysis, planning and optimisation process is performed by ELA with support from the client and the RHA SQE to consider the following in accordance with the Flight Safety Code, but not limited to, impacts and constraints:

1. Public safety
   - Total casualty expectation
   - Individual risk isopleths
   - Population centres and population densities
   - Aircraft routes
   - Shipping routes
   - Trigger debris and assets of catastrophic potential
   - 3-sigma* recovery areas for scheduled debris
   - Meteorological effects
   - Failure probabilities and failure modes
2. Environmental
   - Matters of National Environmental Significance (MNES) within 3-sigma* recovery areas for scheduled debris
   - Impact of recovery of scheduled debris
   - Fuel type, burn rate and residual quantities in scheduled debris
   - Aboriginal Areas Protection Authority (AAPA) matters
   - Heritage matters
3. Mission constraints and objectives
   - Launch window requirements
   - Launch vehicle performance constraints
   - Launch parameter constraints
   - Orbit requirements (e.g., final inclination, final orbital altitude, payload capacity)
4. Other Impacts
   - Community events
   - Availability of supporting infrastructure down range (Ground stations, recovery)

4 ASSESSMENT OF ENVIRONMENTAL IMPACTS

To assess the impacts a proposed launch trajectory may have on all relevant environmental matters, ELA, with support from subject matter experts (SMEs), conducts impact assessments to determine whether the proposed action (specific launch) is approved under a valid current environmental approval.

If the internal impact assessments determine that the proposed action falls outside of environmental approvals, ELA, where possible, reiterates the process of optimisation and selection of the launch trajectory. The new iteration of trajectory optimisation and selection takes into the account the new environmental constraints posed by environmentally protected matters as identified in the impact assessment.

Through engagement and consultation with local stakeholders, this review process may require survey work to help inform final risk assessments and recovery planning.

If the Optimised Mission is within the scope of a valid current environmental approval, ELA may proceed without further approval necessary and documents the findings of the impact assessment within the ALP process.

If the Optimised Mission is not within the scope of a valid current environmental approval, then ELA performs and keeps on record an NT EPA Self-Assessment and/or EPBC Self-Assessment, if required, to determine whether the proposed action impacts items including:

1. For NT EPA Self-Assessment
   - Land
     - Landforms
     - Terrestrial environmental quality
     - Terrestrial ecosystems
   - Water
     - Hydrological processes
     - Inland water environmental quality
     - Aquatic ecosystems
   - Sea
     - Coastal processes
     - Marine environmental quality
     - Marine ecosystems
   - Air
     - Air quality
     - Atmospheric processes
   - People
     - Community and Economy
     - Culture and heritage
     - Human health
2. For EPBC Self-Assessment
     - National threatened species and ecological communities
     - Migratory species under international agreements
     - Ramsar wetlands of international significance
     - the Commonwealth marine environment
     - World Heritage properties, and
     - National Heritage places

Figure 1 depicts the mission optimisation process, including the activities undertaken to ensure environmental constraints are adhered to, mitigated or managed in accordance with the requirements of the environmental approvals held.

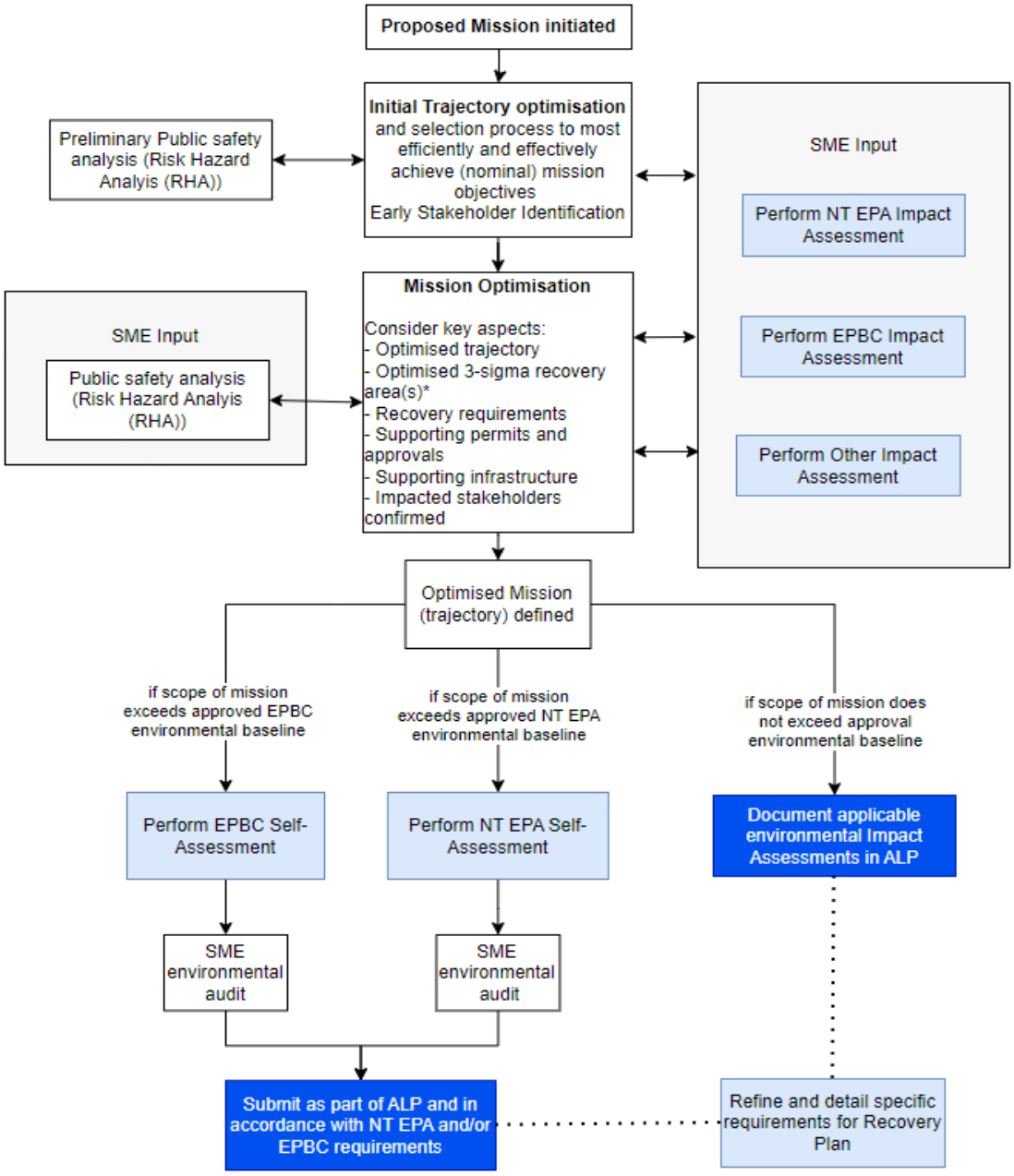

Figure 1 – Mission Optimisation Process – Environmental Actions

* 3-sigma recovery areas, within which 99.7% of all schedule debris will impact, are determined during the mission optimisation process and are optimised to minimise environmental and public risk. This implies that there exists only a 0.3% probability that potential debris will descend outside of the designated recovery areas.

In the event of environmental non-compliance to the above process, which may include an inability to recover vehicle hardware and/or impacts of unscheduled debris (vehicle failure) outside of approved areas, ELA performs the NT EPA and/or EPBC incident reporting process.

5 MISSION OPTIMISATION PROCEDURE

See Annex A