GILMOUR SPACE

Bowen Orbital Spaceport

# Waste Management Plan

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# 1 Introduction

Gilmour Space is committed to achieving sovereign orbital launch capabilities for Australia. The Australian space sector represents a small but significant sector of the Australian economy with significant growth potential. The establishment of an operational orbital launch facility will enable greater market participation for Australian space companies in both domestic and international markets.

## 1.1 Purpose

The Bowen Orbital Spaceport (BOS) will generate waste during the ongoing operation of the facility. The responsible management of waste will safeguard the important environmental values of the areas surrounding the launch facility and reduce the risk of impacts to persons and property. This Waste Management Plan (WMP) documents the requirements and activities to sustain a compliant and responsible management of waste streams generated by the construction and operation of the BOS.

Key elements of this management plan include:

- Accountabilities and responsibilities for waste management.
- A description of generated waste streams.
- A compliant and practical waste management strategy

## 1.2 Scope

This WMP provides an overview of the waste management considerations relevant to support the construction and operational phases of the Bowen Orbital Spaceport.

## 1.3 Legislation, Standards and Guidelines

States and Territories have the primary responsibility for regulating and administrating waste in Australia. The Queensland government framework requires the local governments to be responsible for waste management within their local areas. This project is within the Whitsunday Regional Council (WRC) area and as such waste must be compliant with the framework established by the WRC as well as any state and commonwealth legislations. A summary of the key legislations relevant to the generation and management of waste are below:

Commonwealth Legislation:

- **Department of Agriculture, Water, and the Environment**
  - National Waste Policy 2018
  - Recycling and Waste Reduction Act 2020

State Legislation:

- **Department of Environment and Science**
  - Waste Reduction and Recycling Act 2011
  - Waste Reduction and Recycling Regulation 2011
  - Environment Protection Act 1994
  - Environment Protection Regulation 2019
  - Environmental Protection (Water and Wetland Biodiversity) Policy 2019

Local Legislation:

- **Whitsunday Regional Council**
  - Local Law No. 3 (Community and Environmental Management) 2014
  - Local Law No. 7 (Waste Management) 2020

# 2 Roles and Responsibilities

All employees and contract staff and visitors are responsible for conducting waste management practises. This includes complying with relevant approval / permit requirements and that all reasonable and practical measures to prevent or minimise the harm are taken for all activities.

**Contractors and Employees – All Phases**

- Assess the workplace and work activities for opportunities to reduce waste generation.
- Ensure that generated waste is handled appropriately.

**Launch Site Supervisor – All Phases**

- Ensure employees, contractors and visitors have sufficient knowledge and training in waste management practices while on site at the Bowen Orbital Spaceport facility.
- Ensure that all waste generated at the site is identified and treated in accordance with the WMP and any associated plans.
- Regularly review and update the WMP as required.

**Engineering Discipline Managers – All Phases**

- Assess operational activities for opportunities to reduce generation of waste.
- Ensure waste streams generated by work streams are treated in accordance with this plan.

**Workplace Health and Safety Officer – All Phases**

- Provide guidance and facilitation for assessment of waste treatment related risks and ensure appropriate controls for those risks are implemented.
- Supervise audits and verifications on the storage and disposal of generated waste.

# 3 Waste Management Policy

## 3.1 Waste Management Strategy

Gilmour Space seeks to sustainably deal with all waste generated at the BOS. The Recycling and Waste Reduction Act of 2020 introduces the waste management hierarchy. This hierarchy is used below to explain the Gilmour Space waste management strategy.

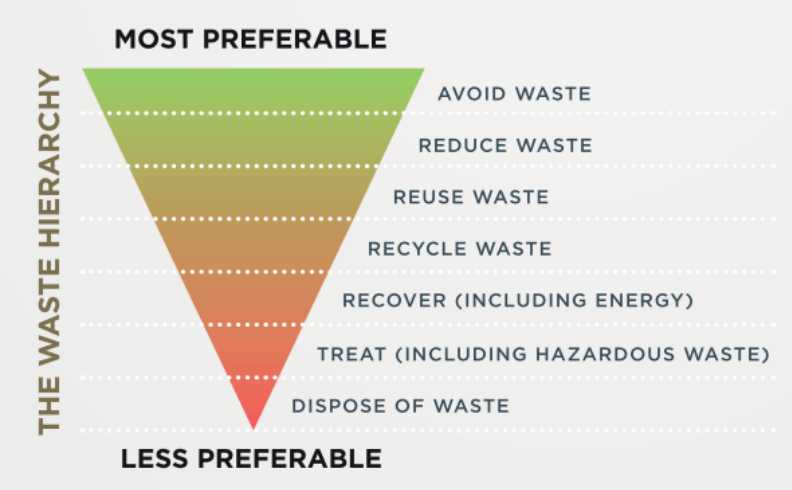


*Figure 1 - Waste Management Hierarchy*

### 3.1.1 Waste Avoidance

Waste avoidance is primarily achieved at a planning level and includes the optimisation of resource input to the facility, selection of more energy efficient design and fitout where possible and selection and contracting of service providers with inclusion of provisions relating to waste reduction targets. Waste avoidance achieves cost effectiveness in the planning stage.

### 3.1.2 Waste Reduction

Waste reduction may occur at any phase of operations through review of current resource inputs and processes to reduce waste generation or energy use. Waste avoidance is a continual optimisation activity. Waste reduction will reduce the cost of operation through reduction in resource cost and reduction in the cost of waste disposal.

### 3.1.3 Waste Reuse

Waste that can be re-used with minimal treatment (decanted propellant or oxidiser) or returned to the supplier for re-use (packaging materials or bulk containers) will be employed where available and will in turn generate cost savings and reductions in waste generation.

### 3.1.4 Waste Recycling

Wastes that are recyclable will be sorted and stored on site for collection by a waste transport services provider. Recycling will provide raw materials for input to different processes. BOS will identify a suitable waste transport provider for all identified recyclable waste streams.

### 3.1.5 Waste Treatment

Waste treatment will be required for some waste streams generated at the BOS. Oxidisers may be treated on site to de-nature for dispersal in accordance with BOS operating procedures.

Any spills or leakage of fluids kept on site will be treated in accordance with the BOS Emergency / Incident Response Plan.

Waste waters will be connected to sewerage lines for processing through existing water treatment plants (LCC) or treated on site (VAB) via compliant sewage systems (approved septic pit or bio) with processed liquids and solids removed by contractor or treated and dispersed for land care use.

### 3.1.6 Waste Disposal

Wastes that cannot be otherwise re-used, recycled, or treated will be separated and stored appropriately in designated waste storage areas for collection by an authorised and contracted provider. BOS will identify a suitable waste disposal provider and implement contracted support for waste disposal from the site.

# 4 Waste Generation

The primary purpose of the Bowen Orbital Spaceport is to support the safe execution of launch missions which are typically campaigned as 60-90 day long activities supported by a team of approximately 20 engineers and technicians, involving the key phases below:

- **Transport** - Transport, and receipt of launch vehicle stages and rocket ancillaries at the BOS.
- **Inspection** - Inspection and repairs (where required) of the transported launch vehicle stages.
- **Assembly** - Cleaning, manufacture, assembly, verification, and testing of launch vehicle and fluids.
- **Launch Ops** - Erection of launch vehicle on launcher, connection, and testing of launch fluid systems.
- **Launch** - Range safety, fluids filling and launch.
- **Recovery** - Inspection and remediation of the facility in readiness for next launch mission.
- **Operations** - General activities associated with the maintenance and operation of a facility and site.

Waste material is generally material that has been used to its useful life or is the result of a process or is the surplus to a process. For this WMP we will classify waste into three streams:

- **Regulated.**
- **Disposable.**
- **Recyclable.**

## 4.1 Regulated or Hazardous Waste

*Table 1 - Regulated or Hazardous Waste*

| Waste Name | Waste Description | Phase |
|---|---|---|
| Metal Swarf | Metal Chips / Filing | Inspection / Assembly |
| Carbon Fibre Swarf | Carbon Fibrous Waste | Inspection / Assembly |
| Graphite Swarf | Graphite Dust / Chips | Inspection / Assembly |
| IPA | Liquid Isopropyl Alcohol | Inspection / Assembly |
| Hydrogen Peroxide | Liquid High Purity H2O2 | Assembly / Launch Ops |
| RP-1 / D60 | Liquid High Purity Kerosene | Assembly / Launch Ops |
| Diesel | Liquid Diesel | All Activity Phases |
| CitriSurf 3050 | Passivation Agent | Inspection / Assembly / Launch Ops |
| Extreme Power Green | Cleaning agent | Manufacture / Assembly / Launch Ops |
| Contaminated PPE | PPE with residue from any of the substances above as solid waste | All Activity phases |

## 4.2 Disposable General Waste

*Table 2 - Disposable General Waste*

| Waste Name | Waste Description | Activity |
|---|---|---|
| Green Waste | Vegetation removed during maintenance or clearing. | Operations |
| Putrescible and other domestic waste | Food scrap, food wrappers, textile materials, plastic wrapping, aluminium wrapping, waxy paper and cardboard, non-recyclable plastics. | Operations |
| Sewage | Sewage from Ablutions. | Operations |

## 4.3 Recyclable General Waste

*Table 3 - Recyclable General Waste*

| Waste Name | Waste Description | Activity |
|---|---|---|
| Domestic Recyclables | Pet bottles, cardboard and paper packaging, glass, metal packaging. | Operations |
| Grey water | Water utilised for domestic purposes. | Operations |

# 5 Waste Management Practices

BOS induction process will ensure that all employees and contractors are aware of the waste management hierarchy, the three categories of waste identified and the appropriate treatment for wastes generated by their business unit's activities.

## 5.1 Anticipated Waste Flows

The normal operational activity of the BOS will encompass the management of waste streams through an understanding of waste volumes, sources, and destinations.

### 5.1.1 Regulated, Listed, Hazardous, Controlled and Trackable Waste

*Table 4 - Regulated, Listed, Hazardous, Controlled and Trackable Waste Flow*

| Waste Name | Waste Source | Volume/annum | Waste Destination |
|---|---|---|---|
| Metal Swarf | VAB | <25kg | Recycle via Contractor |
| Carbon Fibre Swarf | VAB | <25kg | Disposal via Contractor |
| Graphite Swarf | VAB | <25kg | Recycle via Contractor |
| IPA | VAB | 300L | Disposal via Contractor |
| High Test Peroxide | LPAD | 10000L | Treatment on Site or shipping to Helidon test site for re-use |
| RP1(D60) | LPAD | 600L | Disposal via Contractor or ship to Helidon test site for re-use |
| Diesel | BOS | Less than 50L | Disposal via Contractor |
| Citri-surf 3050 | VAB | 500L | Disposal via Contractor |
| Extreme Power Green | VAB | 500L | Disposal via Contractor |
| Contaminated PPE | VAB/LPAD | 100kg | Disposal via Contractor |

### 5.1.2 General Disposable Waste

*Table 5 - General Disposable Waste Flow*

| Waste Name | Waste Source | Volume/annum | Waste Destination |
|---|---|---|---|
| Green Waste | VAB LCC | 72m$^3$ | Disposal Via Contractor |
| Putrescible and other domestic waste | VAB LCC | 9500kg | Disposal via Contractor |
| Sewage | LCC | 10kL | Connected to NQBP water treatment plant |
| Sewage | VAB | 180kL | Treated on site |

### 5.1.3 General Recyclable Waste

*Table 6 - General Recyclable Waste Flow*

| Waste Name | Waste Source | Volume/annum | Waste Destination |
|---|---|---|---|
| Recyclable domestic waste | VAB LCC | 3800kg | Disposal via Contractor |
| Grey water | LCC | 10kL | Connected to NQBP water treatment plant |
| Grey water | VAB | 180kL | Treated on site |

## 5.2 Waste Tracking Procedures

In line with the requirements of the Recycling and Waste Reduction Act, the BOS will seek to avoid the creation of waste and increase the circular flow of the waste streams generated by BOS activity. To track and target waste reductions, the BOS will regularly record waste generation by use of registers and contractor invoices for recycling and re-use and regularly review progress towards reduction in waste.

### 5.2.1 Regulated, Listed, Hazardous, Controlled and Trackable Waste

Regulated waste will be recorded upon each interaction with removal for disposal or recycling by the contractor.

### 5.2.2 General Disposable Waste

General disposable waste will be estimated on a regular basis based upon the frequency of full containers removed by contractors

### 5.2.3 General Recyclable Waste

General recyclable waste will be estimated on a regular basis based upon the frequency of full containers removed by contractors

### 5.2.4 Tracking Documentation

Documentation on waste quantities will be reviewed by BOS management on a regular basis to inform reduction activities.

# 6 Training

Gilmour Space employees, contractors or visitors who wish to access the Bowen Orbital Spaceport area will be required to complete site safety inductions prior to being approved for site access. It is a requirement that all personnel on site are inducted and/or trained to a level proportionate to the responsibilities and level of risk of their individual work activities. Inductions and training will include for managing the disposal of waste streams depending on the individual requirements.

# 7 Compliance Management

## 7.1 Planning

Management of waste streams is an ongoing process requiring day to day as well as long-term planning by site supervision and management. This includes having adequate registers, checks and processes, and contracts available for waste management of all waste streams.

This plan is to be informed by a bi-annual evaluation and management review of the efficacy of this plan.

## 7.2 Auditing and Reporting

Ad-hoc annual internal auditing on waste compliance will be implemented by the site Workplace Health and Safety Officer and the Site Supervisor. These audits will be reported to management to ensure that waste generation and management practices meet business objectives.

Incidents involving the generation or management of waste at the Bowen Orbital Spaceport are to be reported to site supervision and logged the incident management system immediately upon identification for investigation and remediation where appropriate.

## 7.3 Evaluation and Review

This plan will be evaluated on a bi-annual basis for compliance by the Site Supervisor. This management plan will be reviewed as required but at least annually and at the completion of any significant launch campaign to confirm the plans continued suitability.

# Abbreviations

| Abbreviation | Definition |
|---|---|
| **1080** | Sodium Fluoroacetate |
| **ACH** | Aboriginal Cultural Heritage |
| **ADG Code** | Australian Code for the Transport of Dangerous Goods by Road and Rail |
| **APSDA** | Abbot Point State Development Area |
| **ASA** | Australian Space Agency |
| **BOS** | Bowen Orbital Spaceport |
| **CSMP** | Coral Sea Marine Park |
| **DA** | Development Application |
| **DFO** | Distant Focusing Overpressure |
| **DGR** | Dangerous Goods Regulations |
| **ECSS** | European Cooperation for Space Standardization |
| **EDQ** | Economic Development Queensland |
| **EMP** | Environmental Management Plan |
| **EP Act** | Environmental Protection Act |
| **ERA** | Environmentally Relevant Activity |
| **ESC** | Erosion and Sediment Control |
| **ESCP** | Erosion and Sediment Management Plan |
| **FMECA** | Failure Modes, Effects, and Criticality Analysis |
| **FMP** | Facilities Management Plan |
| **FSS** | Flight Safety System |
| **GBRMP** | Great Barrier Reef Marine Park |
| **GBRMPA** | Great Barrier Reef Marine Park Authority |
| **GP** | General Public |
| **GST** | Gilmour Space Technologies |
| **$H_2O$** | Water |
| **$H_2O_2$** | Hydrogen Peroxide |
| **HDGMP** | Hazardous and Dangerous Goods Management Plan |
| **IAASS** | International Association for the Advancement of Space Safety |
| **IATA** | International Air Transport Association |
| **IMDGC** | International Maritime Dangerous Goods Code |
| **Kero** | Kerosene |
| **LCC** | Launch Control Centre |
| **LEO** | Low Earth Orbit |
| **LMP** | Land Management Plan |
| **LOx** | Liquid Oxygen |
| **LPAD** | Launch Pad |
| **MCU** | Material Change of Use |
| **MEDQ** | Minister for Economic Development of Queensland |
| **NASA** | National Aeronautics and Space Administration |
| **NEW** | Net Explosive Weight |

| | |
|---|---|
| **NQBP** | North Queensland Bulk Ports |
| **$O_2$** | Oxygen |
| **PCBU** | Person Conducting a Business or Undertaking |
| **PPE** | Personal Protective Equipment |
| **RHD** | Rabbit Haemorrhagic Disease |
| **SDA** | State Development Area |
| **SDS** | Safety Data Sheet |
| **SPP** | State Planning Policy |
| **SSP** | Site Security Plan |
| **TAP** | Transport and Access Plan |
| **TBC** | To be Confirmed |
| **TNT** | Trinitrotoluene |
| **UN** | United Nations |
| **VAB** | Vehicle Assembly Building |
| **WHS** | Workplace Health and Safety |
| **WMP** | Waste Management Plan |
| **WRC** | Whitsunday Regional Council |