



## **Australian Government**

---

# **Department of Climate Change, Energy, the Environment and Water**

## **DAVIS CRITICAL INFRASTRUCTURE WORKS**

STATEMENT OF EVIDENCE TO THE PARLIAMENTARY STANDING COMMITTEE  
ON PUBLIC WORKS

Date of Submission: October 2024

**THIS PAGE IS INTENTIONALLY BLANK**

## Contents

|    |   |    |
|----|---|----|
| 1  | EXECUTIVE SUMMARY .....                   | 4  |
| 2  | INTRODUCTION .....                        | 5  |
| 3  | NEED FOR WORKS.....                       | 7  |
| 4  | PURPOSE OF WORKS.....                     | 8  |
| 5  | OPTIONS CONSIDERED.....                   | 10 |
| 6  | SCOPE OF WORK .....                       | 12 |
| 7  | PLANNING AND DESIGN CONCEPTS.....         | 13 |
| 8  | ENVIRONMENTAL SUSTAINABILITY .....        | 16 |
| 9  | OTHER CONSIDERATIONS .....                | 19 |
| 10 | COST-EFFECTIVENESS AND PUBLIC VALUE ..... | 22 |
| 11 | APPENDICIES .....                         | 26 |

# 1 EXECUTIVE SUMMARY

- 1.1 The Department of Climate Change, Energy, the Environment and Water (the Department) has established the Antarctic Infrastructure Renewal Program (AIRP), which will deliver the Davis Critical Infrastructure Works.
- 1.2 The Davis Critical Infrastructure Works includes the replacement of end-of-life water, power and mechanical services operations at Davis station to enable the station to be capable of supporting full station capacity.
- 1.3 Australia currently maintains three year-round research stations in Antarctica:
  - 1.3.1 Australia's oldest research station, Mawson, is located on the coast at the edge of the Antarctic plateau and has been operating since 1954;
  - 1.3.2 Davis station is located on the coast near the ice-free Vestfold Hills and was built in 1957; and
  - 1.3.3 Casey station is located in the Windmill Islands just outside of the Antarctic Circle and was built in 1969 to replace the nearby Wilkes station.
- 1.4 The last major upgrade to all stations was in the 1980's. Minor upgrades and running repairs have been conducted since then but these assets are aging and further investment in station infrastructure is needed to secure Australia's continued presence in Antarctica.
- 1.5 While all Antarctic stations are ageing and require major works, the water and power security of Davis station is the highest priority to ensure its operation can continue to support life. Davis station has 91 beds on station and is designed to accommodate 91 expeditioners in summer and 35 in winter. However, due to the poor condition of existing infrastructure including essential services (power and water), Davis station can currently accommodate a maximum of 69 expeditioners in summer and 30 in winter.
- 1.6 Through a competitive procurement process, the Department is aiming to form a Program Alliance between world class construction contractors, designers and the Australian Antarctic Division (AAD) to deliver Davis Critical Infrastructure Works through the AIRP.
- 1.7 A Preferred Proponent has been selected and the program now requires Parliamentary approval before the Program Alliance Agreement (PAA) can be executed and works can commence.
- 1.8 This Davis Critical Infrastructure Works are being funded via the Department's annual capital works program, which was increased for the purposes of modernising Australia's Antarctic research stations in 2019.
- 1.9 The overall capital cost of the proposed works is \$251 million excluding GST, including risk, escalation and all AAD support costs including logistics support.
- 1.10 The Department has completed environmental activities including self-assessment under *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* and Environmental Impact Assessments under the *Antarctic Treaty (Environment Protection) Act 1980 (Cth) (ATEP Act)* to facilitate the investigation works, however further assessments will be required to be undertaken by the Department with support from the Program Alliance.
- 1.11 It is the Department's intention that the Program Alliance will help develop and deliver subsequent AIRP works packages, subject to future commitments and approvals.

## 2 INTRODUCTION

### The Australian Antarctic Program

- 2.1 The Department of Climate Change, Energy, the Environment and Water (the Department), through the Australian Antarctic Division (AAD), is responsible for leading, coordinating and delivering the Australian Antarctic program and administering the Australian Antarctic Territory, the Territory of Heard Island and McDonald Islands and Macquarie Island, in the sub-Antarctic.
- 2.2 The Australian Antarctic Strategy and 20 Year Action Plan<sup>1</sup> (the Strategy and Action Plan) sets out Australia's national Antarctic interests and vision for Australia's future engagement in Antarctica. The 2022 update identifies a plan for 2022-2036 and priority actions for the next five years.
- 2.3 A key action arising from the Strategy and Action Plan is to 'Establish Australia's position of science leadership in Antarctica through developing modern and flexible infrastructure, including progressing options for more efficient and flexible use of existing research stations.'
- 2.4 Australia currently has three permanent research stations on the Antarctic continent, Casey, Davis and Mawson, as well as a research station on Macquarie Island in the sub-Antarctic. In addition, Wilkins, located 70 km from Casey is operated through the summer to support intra-continental aviation operations.
- 2.5 Critical scientific research is conducted at Casey, Davis, and Mawson stations by agencies including the AAD, the Australian Radiation Protection and Nuclear Safety Agency, the Bureau of Meteorology and Geoscience Australia. Scientific programs undertaken at these stations include upper atmosphere physics, geosciences, medicine, meteorology, remediation, climate change, biological sciences and monitoring of seabirds.

### Davis Critical Infrastructure Works

- 2.6 Davis is the most southerly Australian Antarctic station. It is situated near the Vestfold Hills, on the Ingrid Christensen Coast of Princess Elizabeth Land. The station is about 20 km from the edge of the continental ice sheet.
- 2.7 Davis is occupied year-round by scientists, operations, trade, and support staff to operate and maintain the facilities and support year-round science activities.
- 2.8 The Davis Critical Infrastructure Works include the replacement of end-of-life water, power and mechanical services operations at Davis station to enable the station to be capable of supporting full station capacity.
- 2.9 The Davis Critical Infrastructure Works are being funded via the Department's annual capital works program, which was increased for the purposes of modernising Australia's Antarctic research stations in 2019.

### The Antarctic Infrastructure Renewal Program (AIRP)

- 2.10 The Davis Critical Infrastructure Works will be delivered by the Antarctic Infrastructure Renewal Program (AIRP).

---

<sup>1</sup> *The Australian Antarctic Strategy and 20 Year Action Plan*  
[http://www.antarctica.gov.au/\\_\\_data/assets/pdf\\_file/0008/180827/20YearStrategy\\_final.pdf](http://www.antarctica.gov.au/__data/assets/pdf_file/0008/180827/20YearStrategy_final.pdf)

- 2.11 The AIRP<sup>2</sup> represents a key component in the enablement of the Strategy and Action Plan, with a vision of:
- 2.11.1 ‘realising future-ready infrastructure that can support a world class Antarctic program that enables Antarctic scientists to focus on answering critical questions of global significance for generations to come’.
- 2.12 In addition to the Davis Critical Infrastructure Works, the AIRP may also deliver (subject to future consideration) additional works packages to sustain and renew infrastructure in Antarctica including (but not limited to):
- 2.12.1 Aviation facility renewals;
- 2.12.2 Renewable energy (including new wind turbines at Mawson);
- 2.12.3 Asbestos removal;
- 2.12.4 Casey station infrastructure upgrades;
- 2.12.5 Mawson station infrastructure upgrades; and
- 2.12.6 Further Davis station infrastructure upgrades.
- 2.13 The AAD proposes to deliver the AIRP through the AIRP Program Alliance (Program Alliance), incorporating world class contractors, designers and the AAD.

---

<sup>2</sup>*Antarctic Infrastructure Renewal Program*, Australian Antarctic Division, November 2022, [Antarctic Infrastructure Renewal Program – Australian Antarctic Program \(antarctica.gov.au\)](https://www.antarctica.gov.au/infrastructure-renewal-program)

### 3 NEED FOR WORKS

- 3.1 Maintaining a strong physical presence in Antarctica through our infrastructure assets and capability is essential to Australia's national Antarctic interests. This includes supporting our scientific activities, facilitating international collaboration, fostering economic opportunities and minimising Australia's environmental impacts in Antarctica.
- 3.2 Without its network of Antarctic stations, the support provided through the vast range of specialised equipment and highly skilled staff, the Australian Antarctic Program would not be able to operate in such a harsh and remote environment.
- 3.3 As outlined in the Strategy and Action Plan, there is an urgent need to ensure Australia's Antarctic scientists and infrastructure specialists are able to work in a safe and modern environment.
- 3.4 Australia currently maintains three year-round research stations in Antarctica:
  - 3.4.1 Australia's oldest research station, Mawson, is located on the coast at the edge of the Antarctic plateau and has been operating since 1954;
  - 3.4.2 Davis station is located on the coast near the ice-free Vestfold Hills and was built in 1957; and
  - 3.4.3 Casey station is located in the Windmill Islands just outside of the Antarctic Circle and was built in 1969 to replace the nearby Wilkes station.
- 3.5 Australia also has one major summer-only station in Antarctica, Wilkins Aerodrome, which is 70 kilometres from the Casey research station. Wilkins Aerodrome was built in 2004 and supports intra-continental flights between Antarctica and Australia.
- 3.6 The last major upgrade to all stations was in the 1980's. Minor upgrades and running repairs have been conducted since then but these assets are aging and further investment in station infrastructure is needed to secure Australia's continued presence in Antarctica.
- 3.7 While all Antarctic stations are ageing and require major works, the water and power security of Davis station is the highest priority to ensure its operation can continue to support life. Davis station has 91 beds on station and is designed to accommodate 91 expeditioners in summer and 35 in winter. However, due to the poor condition of existing infrastructure including essential services (power and water), Davis station can currently accommodate a maximum of 69 expeditioners in summer and 30 in winter. This is reliant on a 250KL water delivery at the start of every summer season (November) or population numbers are required to be reduced.
- 3.8 Many Davis station buildings and infrastructure are either at end of life or nearing end of life. The facilities need to be renewed and stabilised, to achieve increased accommodation numbers. Specifically, the key issues identified include:
  - 3.8.1 **Insufficient resilience of the water supply and insufficient capacity:** Davis has one water source and is only accessible from late January to early April. Failure of this water source would be catastrophic to the ability of the Department to staff the station;
  - 3.8.2 **Insufficient power capacity to support existing operations:** The Davis main powerhouse currently runs at 150% (three generators) to supply station needs and has insufficient backup generators for sufficient redundancy; and
  - 3.8.3 **Poor quality vehicle workshops and storage of parts:** The existing trade and vehicle workshops are at end of life and no longer meet the needs of the station.

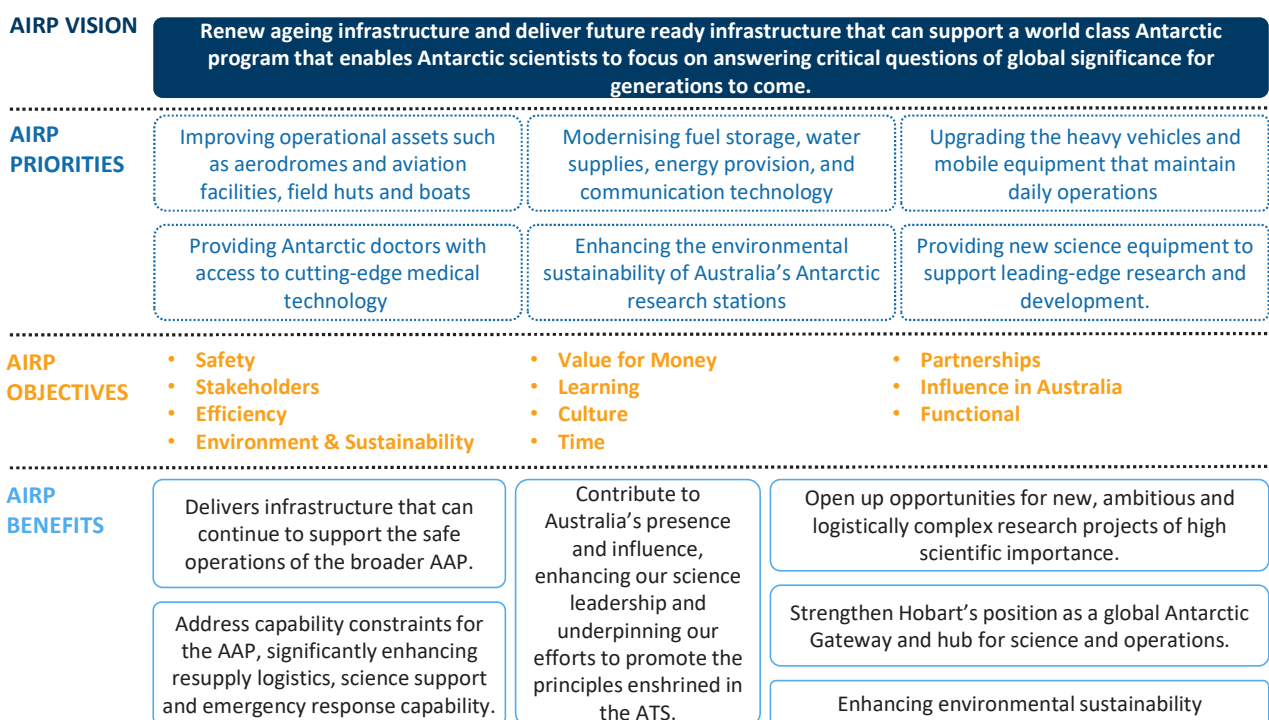
## 4 PURPOSE OF WORKS

- 4.1 The Davis Critical Infrastructure Works will replace end-of-life water, power and mechanical services operations at Davis station to enable the station to be capable of supporting full station capacity.
- 4.2 The AIRP has been established to deliver the Davis Critical Infrastructure Works and (subject to future consideration) provide an efficient delivery mechanism to investigate, develop and deliver infrastructure sustainment and renewal for Australia’s ageing research stations and logistic pathways. Through the AIRP, assets and infrastructure at the end of their useful life will be upgraded and modernised, which in turn will contribute to improved operational and scientific outcomes.
- 4.3 The purpose of the AIRP includes:
  - 4.3.1 Delivery of infrastructure that can continue to support the safe operations of the broader Australian Antarctic Program;
  - 4.3.2 Addressing capability constraints for the Australian Antarctic Program, significantly enhancing resupply logistics, science support and emergency response capability;
  - 4.3.3 Contributing to Australia's presence and influence, enhancing our leadership and underpinning our efforts to promote the principles enshrined in the Antarctic Treaty System;
  - 4.3.4 Opening up opportunities for new, ambitious and logistically complex research projects of high scientific importance; and
  - 4.3.5 Strengthening Hobart's position as a global Antarctic Gateway and hub for science and operations.

### Strategic overview

4.4 The strategic overview for the AIRP is summarised in Figure 1.

Figure 1: AIRP Strategic Overview





## Objectives

4.5 The AAD has set out its objectives for the AIRP, informed by the AIRP priorities and overarching vision to support delivery of the Program in Table 1.

Table 1: AIRP Objectives

| Objective                               | Description  |
|---|--|
| <b>Safety</b>                           | <ul style="list-style-type: none"> <li>Be a leader in safety and wellbeing culture for all the activities of our program, such that our performance is among industry leaders.</li> </ul>  |
| <b>Environment &amp; Sustainability</b> | <ul style="list-style-type: none"> <li>Extend our commitment beyond environmental and sustainability stewardship and deliver resilient initiatives, including:                             <ul style="list-style-type: none"> <li>Deliver net-zero emissions pathway and a material reduction of operational asset carbon emissions compared to the AAD’s historic baseline levels;</li> <li>Reduced environmental footprint of the final assets through site decontamination and efficient layout;</li> <li>Achieve for the assets a leading recognised sustainability rating applicable in Antarctic;</li> <li>Achieve a leading measure of recycling of construction and demolition waste for all program activities; and</li> <li>Achieve a leading measure of efficient energy and resource use in construction and manufacturing practices.</li> </ul> </li> </ul> |
| <b>Culture</b>                          | <ul style="list-style-type: none"> <li>Build a safe, diverse, inclusive, and high performing culture underpinned by engaging values and demonstrated positive behaviours.</li> </ul>   |
| <b>Influence in Antarctica</b>          | <ul style="list-style-type: none"> <li>Ensure our program activities support and build Australia’s position as a key influencer among the members of the Antarctic Treaty.</li> </ul>  |
| <b>Stakeholders</b>                     | <ul style="list-style-type: none"> <li>Create enduring connections with our partners, community, and our people by ensuring we actively seek to understand and meet the needs of our key stakeholder groups.</li> <li>We will strengthen the AAD’s relationships with its internal and external community by ensuring our engagements with our stakeholders are founded on respect, trust and mutual benefit that leads to lasting relationships, and our actions leave a positive legacy amongst stakeholders beyond the program.</li> </ul>  |
| <b>Cost and Value</b>                   | <ul style="list-style-type: none"> <li>Ensure the Program achieves value for money by fully and safely accommodating summer and winter population across Davis, Casey and Mawson research stations within the approved funding.</li> </ul>   |
| <b>Time</b>                             | <ul style="list-style-type: none"> <li>Deliver infrastructure upgrades to meet the milestones of funded work packages.</li> </ul>  |
| <b>Functional</b>                       | <ul style="list-style-type: none"> <li>Deliver infrastructure that is adaptable, flexible, innovative and provides a reliable and safe workplace to end users, meets contemporary functional and operational standards with minimal workplace adjustments (total across the stations) to address initial functionality gaps.</li> </ul>  |
| <b>Efficiency</b>                       | <ul style="list-style-type: none"> <li>Design and deliver with a focus on efficient use of resource, space and energy, reduces ongoing maintenance effort, and reduce infrastructure operational costs.</li> </ul>   |
| <b>Learning</b>                         | <ul style="list-style-type: none"> <li>Form continuing, productive relationships with industry partners and continue to uplift the AAD’s lessons management practices by promoting a culture of learning, advancement, and continuous improvement.</li> <li>Enable delivery partners to carry out regular and comprehensive sharing of lessons learned and develop viable and scalable recommendations that can be implemented across the Program.</li> </ul>  |
| <b>Partnerships</b>                     | <ul style="list-style-type: none"> <li>Recognise, learn from and leverage the required dependency upon the AAD’s and the industry partner’s capability by ensuring:                             <ul style="list-style-type: none"> <li>The AAD progressively improves its design of science spaces, logistics, remote supply chains, and its capability in constructing in cold climate conditions; and</li> <li>Building the industry’s capability to support other Antarctic Treaty nation(s) infrastructure builds.</li> </ul> </li> </ul>  |

## 5 OPTIONS CONSIDERED

- 5.1 The AAD has considered a range of potential scope compositions and delivery model options for the Davis Critical Infrastructure Works.
- 5.2 As previously identified in Section 2 - Need for the Works, the last major upgrade made to each of Australia's Antarctic research stations occurred in the 1980's, and all stations currently require major capital works.
- 5.3 While all Antarctic stations are ageing and require major works, the water and power security of Davis station is the highest priority to ensure its operation can continue to support life.
- 5.4 In addition to the Davis station being in the highest need of upgrade, the works at Davis are also able to efficiently utilise the design work previously undertaken as part of the cancelled Davis Aerodrome Project procurement process.
- 5.5 A 'Do Nothing' option has not been considered as it would not address the hazards caused by the ageing infrastructure and would not have met the Government's stated requirement that the previously allocated funding is intended for.
- 5.6 The remainder of the Program will be further considered as potential additional works packages.

### Delivery Model options

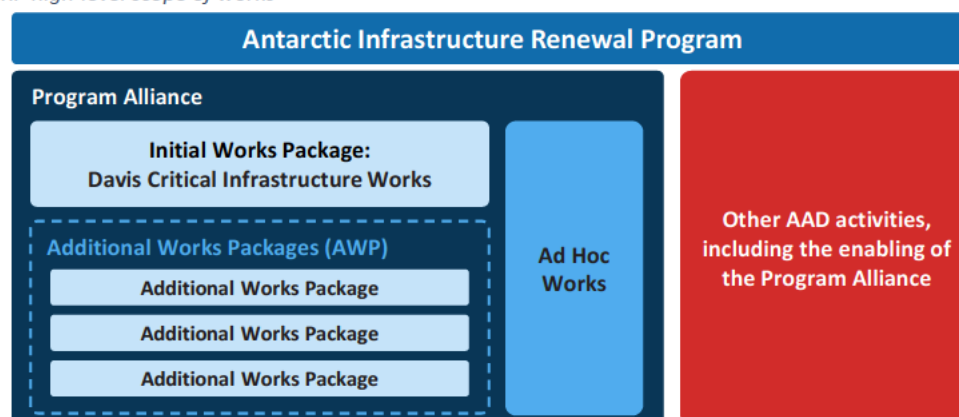
- 5.7 The AAD considered a range of delivery models for the Davis Critical Infrastructure Works and broader AIRP (including consideration of both market driven and self-delivery approaches). Delivery model options considered in the analysis included:
  - 5.7.1 Self-delivery (AAD led);
  - 5.7.2 Public Private Partnership;
  - 5.7.3 Design and Construct;
  - 5.7.4 Construct Only;
  - 5.7.5 Engineering, Procurement and Construction Management;
  - 5.7.6 Managing Contractor;
  - 5.7.7 Project Alliance; and
  - 5.7.8 Program Alliance.
- 5.8 Each delivery model has been screened against a pre-defined set of evaluation criteria that were developed by the AAD and its advisors to determine if a model was suitable to manage the characteristics and risk profile of the works. The criteria used for the assessment included that the delivery model in question:
  - 5.8.1 Effectively integrates the AAD's knowledge, capability and skills related to working and delivering projects in Antarctica;
  - 5.8.2 Allows for a joint definition between the AAD and the contractor of any emerging program scope;
  - 5.8.3 Promotes a positive response to risks that are difficult to define and allocate, uncertainty and complexity; and
  - 5.8.4 Is understood by the market and promotes sufficient market appetite.
- 5.9 Using the above criteria, self-delivery, Public Private Partnership, Design and Construction, Construct Only and Engineering Procurement Construction Management were evaluated as not suitable and as such were not shortlisted.

- 5.10 Program Alliance, Project Alliance and Managing Contractor options were evaluated as either partially or fully meeting the assessment criteria and shortlisted for further assessment.
- 5.11 A qualitative assessment of the Managing Contractor, Project Alliance and Program Alliance options was then undertaken with consideration given to program characteristics, program objectives, procurement objectives and program risks. Based on this assessment, both Project Alliance and Managing Contractor options were considered as less likely to deliver value for money than a Program Alliance.
- 5.12 A Program Alliance, delivered in accordance with the National Alliance Contracting Guidelines, was evaluated to be the likely most effective and efficient approach for delivering the works, given the complexity and scale of the program, and the need for a collaborative and flexible approach to delivery.
- 5.13 Alliancing is a form of relationship contracting in which the Commonwealth collaborates with non-owner designers and constructors to share risks and responsibilities in delivering the construction phase of a project. Project delivery risks are shared by the alliance participants via pre-agreed cost pain/gain share arrangements. Program Alliance partners can be guaranteed reimbursement of their direct project costs and payment of project overheads in an open-book arrangement. A Program Alliance is a long-term alliance, established to deliver multiple work packages utilising the commercial framework and pricing established as part of the initial competitive procurement process.
- 5.14 A competitively procured Program Alliance was considered to be suitable for the AIRP as it will:
- 5.14.1 Provide for effective integration and collaboration between the AAD and the delivery partner to draw upon the AAD's logistic expertise, Antarctic operations, and workforce management skills to jointly manage, innovate and learn across a portfolio of projects and realise efficiencies;
  - 5.14.2 Cater for improved flexibility across a single contract arrangement, for the program of known, emerging and undefined packages, to better respond, reprioritise, mitigate the cost and time impacts of materialised external risks and avoid price premiums of 'variations';
  - 5.14.3 Realise significant efficiencies from the coordination of planning, management, resourcing, logistics and delivery of packages across the program;
  - 5.14.4 Allow for the opportunity to progressively define and benchmark each successive package providing greater certainty by reference to earlier package actual outturn costs and over the life of the program, resulting in underruns and overruns being less pronounced;
  - 5.14.5 Align with the market expectations of risk arrangements and commercial model; and
  - 5.14.6 Drive commercially incentivised learnings across the program.

## 6 SCOPE OF WORK

- 6.1 The initial stage of the Program Alliance will include the Davis Critical Infrastructure Works involving priority infrastructure renewal to reduce safety risks to expeditioners and improve station operations and capability.
- 6.2 It is the AAD’s intention subsequent works would be delivered by the Program Alliance as additional works packages.
- 6.3 Given the difficulties getting contractors to Antarctica, the contract includes an Ad Hoc Works mechanism to allow the Program Alliance to assist with maintenance activities or emergency repairs, emergency responses and other legal and environmental obligations when on site.
- 6.4 The high-level scope of the broader AIRP is summarised in Figure 2.

Figure 2: AIRP high-level scope of works



### Davis Critical Infrastructure Works

- 6.5 The Davis Critical Infrastructure Works scope of works comprises priority infrastructure renewal at Davis station including:
  - 6.5.1 New water production facilities linked to a diversified water source;
  - 6.5.2 A new main power facility to meet the requirements for the final masterplan, with the ability to integrate renewable energy supplies in the future;
  - 6.5.3 A new vehicle workshop facility;
  - 6.5.4 Refurbishment of trade workshops;
  - 6.5.5 Extension and integration of the site wide reticulation; and
  - 6.5.6 Decommissioning and demolition of redundant structures.

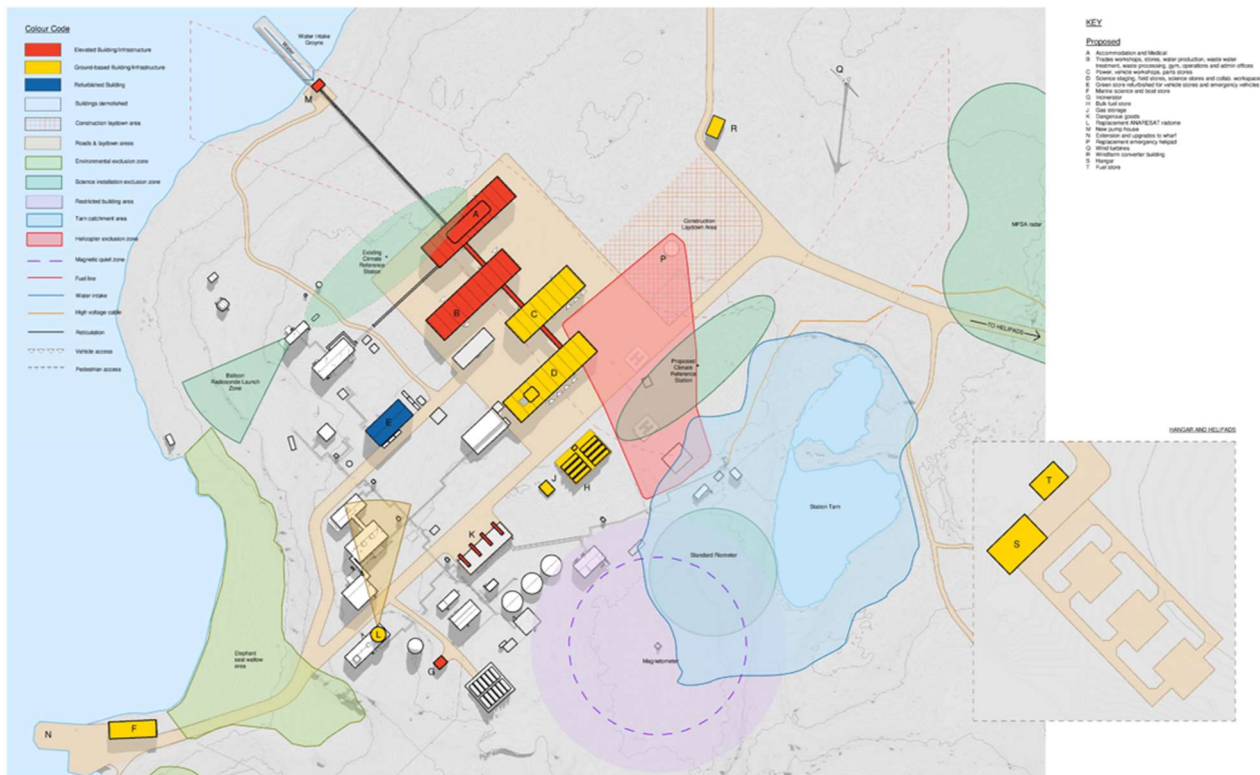
### Additional Works Packages

- 6.6 It is the Department’s intention that the Program Alliance will help investigate, design and deliver subsequent AIRP works packages, subject to future commitments and approvals.
- 6.7 The contract allows the Commonwealth to request the Program Alliance to develop designs and pricing for future works packages.
- 6.8 The scope identified as part of the procurement process was intentionally flexible and allows the Commonwealth the right to alter the mix of scope to be delivered by the Program Alliance, or to add projects to the scope of the Program Alliance (subject to government approvals).

## 7 PLANNING AND DESIGN CONCEPTS

7.1 The AAD has developed a draft masterplan for Davis station (Davis Station Masterplan) and a Reference Design for the works. The Davis Station Masterplan is summarised in Figure 3.

Figure 3: Davis Station Masterplan



7.2 The Masterplan and Reference Design are being used to guide the planning and design requirements for the Program Alliance procurement process, which is currently underway.

7.3 In developing the Reference Design, the following design principles were applied:

- 7.3.1 Providing facilities that meet the projected 50-year design life; and
- 7.3.2 Creating a safer environment to live and work.

7.4 Installing infrastructure that will help decarbonise the stations in East Antarctica;

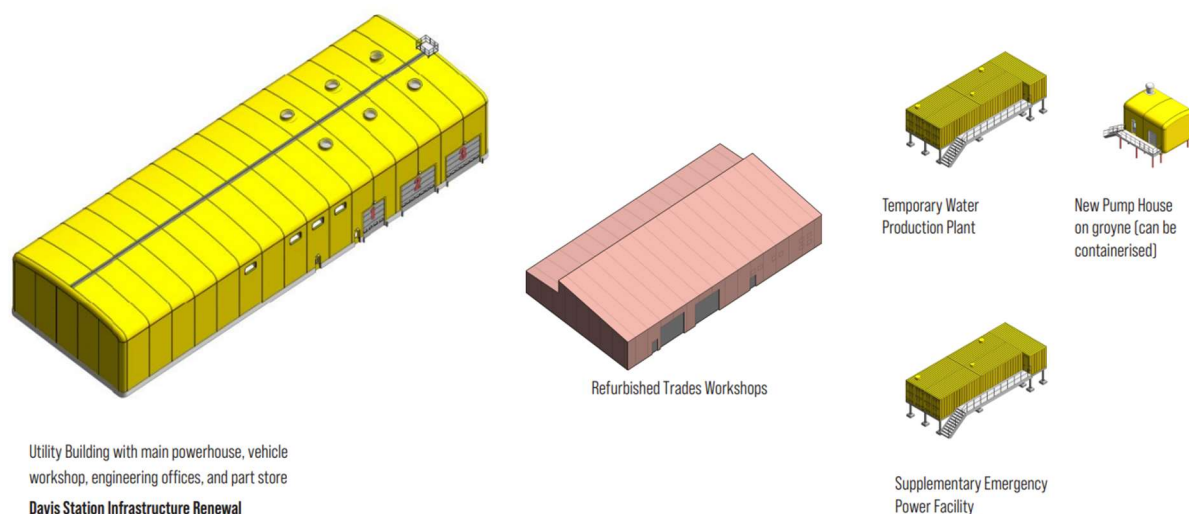
- 7.4.1 Designing facilities that will support a diverse and inclusive station community;
- 7.4.2 Increasing scientific output to support the Australian Antarctic Science Strategic Plan;
- 7.4.3 Creating resilient buildings with back-up systems to ensure that a safe environment is maintained despite system failures and that an ultimate point of refuge is included in case of total catastrophe;
- 7.4.4 Implementing intelligent designs that are simple to implement, maintain, operate and remove at the end of life;
- 7.4.5 Reducing energy intensity, water use and waste to reduce the environmental footprint;
- 7.4.6 Improving space efficiency with space planning and proportioning to reduce circulation and to best suit the planned operations;
- 7.4.7 Providing more efficient buildings that are easily maintained, with services reticulated within a warm, accessible environment;

- 7.4.8 Separating vehicles and pedestrians as far as possible around the site, including considering measures to minimise the need for travel by vehicle;
  - 7.4.9 Reducing snow management by helping to cut down the time and energy needed for moving snow around the station;
  - 7.4.10 Designing spaces that support the well-being of occupants through careful consideration of adjacencies, outlook, and ergonomics;
  - 7.4.11 Targeting environmental gain by locating buildings on previously modified land and restoring unused modified land through decontamination and reinstatement;
  - 7.4.12 Reducing on-site disruption and environmental impact with designs that are quick and easy to build and remove from site;
  - 7.4.13 Developing construction sequencing that ensures that the AAD’s marine and helicopter operations are uninterrupted and that the station always has sufficient water, power, and waste facilities for the required population size;
  - 7.4.14 Improving flexibility using modular structures that allow for easy interior refurbishment and reorganisation in the future to respond to changing needs; and
  - 7.4.15 Providing occupants with the ability to safely evacuate away from a fire to a safe place of refuge in a reasonable timeframe.
- 7.5 As part of the procurement process, designs will be prepared by the Preferred Proponent and assessed as part of the procurement evaluation process.
- 7.6 Designs prepared by the Preferred Proponent will take into consideration the Reference Design, Project Scope and Technical Requirements (PS&TR), Antarctic program logistics and feedback provided by AAD during interactive workshops including prioritisations and constraints.
- 7.7 The designs are supported by technical analysis and test results such as snow drift and sea ice modelling where appropriate.

## Design Concepts

- 7.8 The Reference Design for the Davis Critical Infrastructure Works package is summarised in Figure 4.

Figure 4: Davis Critical Infrastructure Works package



- 7.9 The design includes:
- 7.9.1 **Water Production** facility that will include:
    - Containerised Ultrafiltration and Reverse Osmosis 100kL/day water treatment plants for potable water production.

- A year-round seawater intake pump facility to provide year-round seawater production to improve system resilience.
- 7.9.2 **Main powerhouse** with installed capacity sized for 100% of existing station demand plus the proposed works. The main powerhouse will include capacity for the expansion of the station and to support the transition to renewable energy sources at Davis station in the future without need for extensive modifications to the building structure or infrastructure. Renewable energy components may include but are not limited to wind turbines, solar, hydrogen, phase change materials or batteries.
- 7.9.3 A **vehicle workshop** with three vehicle bays that will provide:
- Storage to support the maintenance of the vehicle and mobile plant fleet associated with the operation of an expanded Davis station.
  - Engineering office with meeting space and associated services.
- 7.9.4 Refurbishment of the **Trades Workshop** that includes asbestos removal; structural repairs; fabric upgrades; alterations to layouts and adjustment of building services.
- 7.9.5 Removal and Remediation of the existing **Main Power House** including:
- Removal of all contents and asbestos.
  - Demolition of the building, all materials returned back to Australia and the site handed over to the AAD remediation team.

## 8 ENVIRONMENTAL SUSTAINABILITY

### Sustainability

- 8.1 The Australian Government has committed to a 2030 net zero emissions target<sup>3</sup> for the Australian Public Service. The Department is responsible for negotiating, reporting and managing Australia's emissions policies and targets.
- 8.2 The AIRP presents an exciting opportunity to support a world-class low carbon renewal program. In the spirit of the Australian Government's Net Zero 2030 policy, the AIRP will be delivered with clear environmental objectives to reduce station operational carbon emissions, minimise embodied and construction carbon and make best use of renewable energy.
- 8.3 The implementation of the AIRP will be underpinned by approaches that limit energy demand, leverage renewable energy, and employ circular economy principles. Broader sustainability issues beyond low carbon infrastructure will also be addressed including whole of life cost, water efficiency, waste efficiency, human centric design, indoor environment quality, materials, and resilience.
- 8.4 The program includes a sustainability strategy that will be updated through the development of the project for additional works. Updates will include improving and building upon the best thinking from other polar and cold climate operations to embed carbon efficiency into the design, transport, construction, and operation of the renewal program.
- 8.5 The Risk or Reward regime for the Program Alliance includes a key performance indicator designed to financially incentivise sustainable delivery for the Davis Critical Infrastructure Works.

### Compliance with Local, State/Territory and Commonwealth Water and Energy Policies

- 8.6 The project does not require referral under the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* to the Minister, on the basis that the AAD has prepared a draft self-assessment that:
  - 8.6.1 determines that the project is not likely to have a significant impact on the internationally and nationally important flora, fauna, ecological communities, heritage places and water resources which are deemed to be matters of national environmental significance or the surrounding environment at Davis research station; and
  - 8.6.2 identifies targeted mitigation and management measures.
- 8.7 A series of Environmental Impact Assessments (EIA) have been completed by the Department to facilitate the investigation works on the project under the *Antarctic Treaty (Environment Protection) Act 1980 (Cth) (ATEP Act)*. These include site visits, geotechnical investigations and condition assessments.
- 8.8 Further EIA's are required to support the future stages of the project works. These will be conducted by the Department with support from the Program Alliance, namely:
  - 8.8.1 The AAD submitted a Preliminary Assessment in September 2024 and an outcome is expected in Quarter 4 2024; and

---

<sup>3</sup> <https://www.finance.gov.au/government/aps-net-zero-emissions-2030>



- 8.8.2 The project will likely require an Initial Environmental Evaluation prior to the 2026/27 summer season, and the AAD will undertake this stage of approvals with the Program Alliance once works have commenced.
- 8.9 The Program Alliance partner will support the AAD in procuring any necessary permits and future Primary Authorisations for any future program scope part of potential future additional works packages development activities.
- 8.10 Shared responsibilities within the Program Alliance will include:
  - 8.10.1 Compliance with all Authorisations, including the specifications and conditions of the Primary Authorisations as applicable to the works;
  - 8.10.2 Ensuring cumulative compliance with approval requirements across the entire AIRP;
  - 8.10.3 Any requirement to obtain all Authorisations (excluding any Primary Authorisations that have been obtained by the AAD), including any secondary consents or approvals required pursuant to any Authorisation as applicable to the works; and
  - 8.10.4 Compliance with laws, relevant policy and guidelines.
- 8.11 All design and construction will comply with the National Construction Code, all relevant Australian Standards and International Standards. Where this is not possible or logical due to the location a comprehensive risk assessment will be developed to capture why the decision is made.

## **Master and Site Planning, Including Details of Future Developments**

- 8.12 In addition to the activities relating to the compliance with Local, State/Territory and Commonwealth Water and Energy Policies, the AIRP has engaged with the Bureau of Meteorology, Geoscience Australia and other external consultants to ensure newly located facilities do not impact on scientific operations and minimise risk from future sea level rise and extreme weather events where practical.
- 8.13 All site planning will be finalised during the detailed design phase of the program.

## **Security Measures**

- 8.14 The redeveloped station designs will utilise the Government’s Protective Security Policy Framework to consider separation and other appropriate security measures to afford privacy and confidentiality to station management, medical facilities, storage and external agency requirements.
- 8.15 The Program Alliance partner will be responsible for implementing security measures and procedures for all activities (and at all geographic locations) associated with the works, including consideration of:
  - 8.15.1 Valuable assets and vulnerable points, and develop a strategy to protect them from the elements (e.g. harsh wind conditions);
  - 8.15.2 Restricting access of personnel to the areas of work;
  - 8.15.3 Restricting access of personnel (excluding those authorised) to key station assets (e.g. those operated by other agencies, hazardous materials storage areas, medical facilities and medicine storage cabinets, science project areas and exclusions zones);
  - 8.15.4 Best effort to prevent wildlife from interfering with buildings at station (e.g. seals) and other activities associated with the works; and
  - 8.15.5 Security management of vehicles on site, including all plant and machinery (e.g. access and usage of assets such as Utes).

## Work Health & Safety

- 8.16 The AAD has Work Health and Safety policies and procedures in place which will apply to all personnel at the stations, including program contractors and sub-contractors.
- 8.17 Renewal of the aviation facilities and Davis station will prioritise the health and safety of both the construction personnel and station personnel at the facilities. Additionally, these works are critical to maintain the safety of these assets, which are at or reaching end of life.

## Diversity & Inclusion

- 8.18 The AAD aims to achieve a truly inclusive and diverse workforce where all people feel valued and supported. To successfully deliver the AIRP, access to a larger workforce will be required to ensure individuals are drawing upon skills effectively from the full range of the Australian population. The Program Alliance will be committed companions guided by a joint Diversity, Equity, and Inclusion Plan. The Program Alliance partner will be required to develop and actively implement a Diversity, Equity, and Inclusion Plan which:
  - 8.18.1 Includes a commitment statement and outlines measurable objectives;
  - 8.18.2 Guides the recruitment of staff or subcontractors that represents a diverse cross section of society;
  - 8.18.3 Ensures a safe and accepting work environment where all staff can bring their authentic selves to work;
  - 8.18.4 Provides a workplace that openly values and supports everyone regardless of their age, background, sexual orientation, race, religious beliefs, qualifications, social status, and abilities;
  - 8.18.5 Details of identifying opportunities for people with disabilities; and
  - 8.18.6 Details of attracting and retaining disadvantaged people such as long-term unemployment, disengaged youth and workers in transition.

## 9 OTHER CONSIDERATIONS

### Legislation, codes and standards

- 9.1 The program will comply will all Commonwealth and International law, legislation, codes and standards relevant to the program.
- 9.2 Key legislation and sources of obligations under international law include:
  - 9.2.1 Environment Protection and Biodiversity Conservation Act 1999 (Cth);
  - 9.2.2 The Antarctic Treaty System, comprised of the 1959 Antarctic Treaty, the Convention for the Conservation of Antarctic Seals (1972), the Convention on the Conservation of Antarctic Marine Living Resources (1980) and the Protocol on Environmental Protection to the Antarctic Treaty (1991);
  - 9.2.3 Protocol on Environmental Protection to the Antarctic Treaty (known as the Madrid Protocol);
  - 9.2.4 Convention on the Conservation of Antarctic Marine Living Resources;
  - 9.2.5 Antarctic Treaty Act 1960 (Cth);
  - 9.2.6 Australian Antarctic Territory Act 1954 (Cth);
  - 9.2.7 Antarctic Treaty (Environment Protection) Act 1980 (Cth);
  - 9.2.8 Antarctic Marine Living Resources Conservation Act 1981 (Cth);
  - 9.2.9 Various domestic legislation relating to the Protection of the Sea, including provisions implementing into domestic law Australia's obligations under the Madrid Protocol and various international shipping conventions;
  - 9.2.10 Biosecurity Act 2015 (Cth); and
  - 9.2.11 Domestic legislation relating to privacy; freedom of information; modern slavery; industrial relations and workplace health and safety.
- 9.3 Participants will also be contractually bound to comply with obligations relating to:
  - 9.3.1 Australian industry participation;
  - 9.3.2 The shadow economy procurement connected policy; and
  - 9.3.3 The *National Construction Code 2022*, which sets the minimum requirements for the design, construction and performance of buildings throughout Australia, and various Australian Standards and other technical and performance standards specified in the technical requirements.

### Construction in a live operational environment

- 9.4 The planning, delivering, and commissioning of Program Alliance works will present a number of unique challenges to the Program Alliance. This is driven by the remote location, Antarctica's challenging climatic conditions, logistics and operational constraints, and the challenge of working in a highly biodiverse area where comprehensive environmental mitigation, management and monitoring requirements are anticipated.
- 9.5 Each site has different operating requirements including flight operations, existing asset operations and maintenance, support activities for living and working at each site and potentially scientific activities in surrounding areas.
- 9.6 Key challenges of the program include:
  - 9.6.1 Maintaining viable supply of energy, water, and accommodation to each station through construction; and

9.6.2 Moving people, materials, and other key resources to and from research stations and other sites with considerations of limited timeframe, trips, and vehicles available.

9.7 Given the challenges associated with building on-site in East Antarctica, the AAD is seeking to consider off-site manufacturing such as Design for Manufacture and Assembly and/or Prefabricated Pre-finished Volumetric Construction wherever possible.

## Logistics

9.8 Logistics and transporting people and materials to Antarctica is challenging, with limited windows available to insert and extract personnel, cargo and equipment. Access is undertaken by either ship or aircraft.

9.9 Shipping access can be undertaken in early season (October and early November) by icebreaker vessel or late season (from January) by ice-strengthened cargo or passenger vessels once sea ice has blown out. Access by ship is not possible in winter months.

9.10 Aviation access to the stations is available through the summer season. Intercontinental flights are possible to Wilkins Aerodrome, with Intracontinental connecting flights to Davis and Mawson research stations. There is no aviation capability during the winter months.

9.11 At Davis station, the ship to shore interface of cargo operations off-loading from a ship presents last mile challenges at Davis harbour. Early season icebreaker voyages may be able to off-load cargo directly onto the sea ice, with later season vessels off-loading cargo onto barges or pontoons once the sea ice has melted.

## Construction Personnel and Workplace Management

9.12 The Program Alliance will develop, implement, and maintain a Workplace Culture Management Plan that defines the goals, activities and performance measures the AIRP will use to shape a workplace culture deliberately and proactively. The elements of the Workplace Culture Management Plan are summarised in Figure 5.

Figure 5: Workplace Culture Management



9.13 Given transport to Antarctica is currently limited to icebreaker voyages and the use of the summer-only ice runway at Wilkins Aerodrome, the ability to move construction personnel to or from Antarctica is constrained. This will likely require long term deployments and may conflict with standard crew rotation schedules. It is anticipated that deployments for construction personnel are likely to be season-long.

9.14 The AAD currently plans and coordinates pre-departure training programs for personnel heading to Antarctica. Field training is planned and delivered according to mode of transportation to the continent, length of time spent on the continent, as well as work requirements.

- 9.15 Additionally, personnel are subject to a medical assessment, assessment of personal qualities as they relate to the Antarctic Service Code of Personal Behaviour and a psychological (adaptability) assessment of a person's ability to effectively adapt and respond to the demands of living and working in Antarctica for an extended period of time.

## 10 COST-EFFECTIVENESS AND PUBLIC VALUE

### Program Delivery Strategy

- 10.1 As summarised in the Options Considered section, the AAD has identified a Program Alliance as the most appropriate mechanism to deliver the works. A Program Alliance enables:
  - 10.1.1 Effective integration and collaboration between the AAD, designers and construction contractors;
  - 10.1.2 Ability to leverage AAD's significant logistics expertise, Antarctic operations and workforce management skills that inform the management and learning across the works; and
  - 10.1.3 Significant efficiencies from the coordination of planning, management, resourcing, logistics and delivery of the works.
- 10.2 The AAD's expectation is that the achievement of the Program Alliance Objectives will be facilitated by the collective responsibilities of the participants, sharing of Program Alliance risks and opportunities and the transparency and behavioural commitments provided through the Program Alliance structure.
- 10.3 The AAD will bring Antarctic experience, logistics network management, remote and cold climate working experience, and a proud commitment to continuing Australia's enduring Antarctic presence and leadership role in the Antarctic Treaty System to the Program Alliance.
- 10.4 The Program Alliance partner will bring leadership in design and delivery of similar infrastructure projects and have a strong, inclusive cultural fit that will see a mutually beneficial partnership over the next 5 to 10 years.
- 10.5 The aim is that all personnel will regard themselves as part of a single organisation where the interests of their own employer are best served by advancing the interests of the Program Alliance.
- 10.6 The expected Program Alliance culture and behaviour commitments of the participants are set out below and will be characterised by the following principles:
  - 10.6.1 Good faith and integrity;
  - 10.6.2 Decision making on a 'best for program' basis;
  - 10.6.3 A 'no fault-no blame' culture;
  - 10.6.4 Transparency through open book documentation and reporting;
  - 10.6.5 A joint management structure where responsibility is shared between the participants; and
  - 10.6.6 A focus on innovation and a culture of continuous improvement.
- 10.7 The AAD's guiding principle for the management of risk within the works is that risks will be shared on the basis that the participants collectively are best able to manage the risk from a value for money position.
- 10.8 The participants will manage risks in accordance with their approved Risk Management Plan, and report to the AAD on the status of risk management activities until Final Completion. The participants will also carry out quantitative analysis of risk to gauge the ongoing program and budget risk to the Program Alliance to ensure the value for money proposition is maintained and that an appropriate level of contingency is retained.

## Program Alliance Procurement Process

10.9 The AIRP is well developed with the procurement underway and has delivered:

- 10.9.1 An open market Expression of Interest process resulted in two Proponents, each executing an Alliance Development Agreement;
- 10.9.2 A competitive Request for Proposal phase including a 21 week Interactive Tender Phase involving collaborative workshops to refine design, assumptions and costs, and the submission of Program Proposals; and
- 10.9.3 A Preferred Proponent has now been selected and is aligning it’s Program Proposal with Department requirements.

10.10 The key Program Alliance procurement schedule is summarised Table 2.

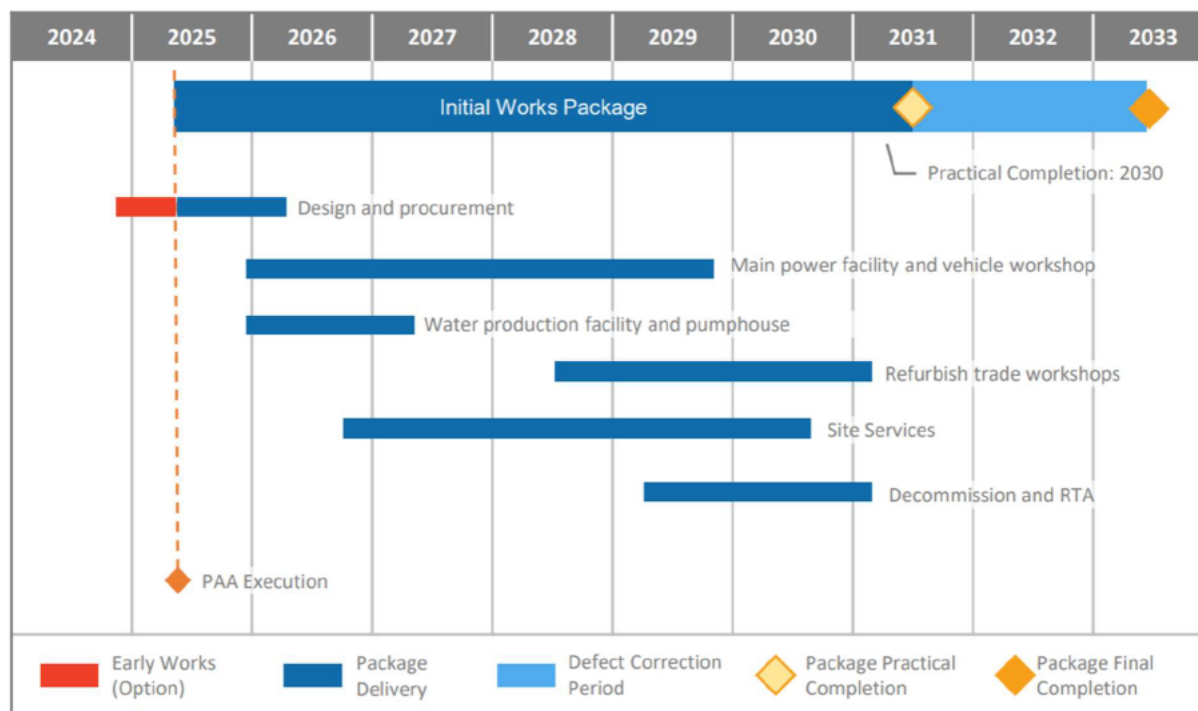
Table 2: Anticipate Key Program Alliance Procurement Milestones

| Ref | Milestone                                       | Target Completion Date |
|-----|---|------------------------|
| 1   | Commencement of Procurement Process (COMPLETED) | 25 July 2022           |
| 2   | Appointment of Preferred Proponent (COMPLETED)  | 27 March 2024          |
| 3   | Execution of the Program Alliance Agreement     | February 2025          |

## Construction Program

10.11 Subject to Parliamentary approval, the Program Alliance is expected to commence activities in early 2025. It is anticipated that the Davis Critical Infrastructure Works will be completed by mid-2030. Figure 6 provides a high-level summary of the AAD’s program for the works.

Figure 6: Construction Program



## Program Costs

10.12 The overall capital cost of the proposed works is \$251 million excluding GST, including risk, escalation and all AAD support costs including logistics support.

- 10.13 The detailed program cost estimate is provided separately as part of the Confidential component of the PWC Submission.
- 10.14 The cost estimate contains the costs to deliver the project attributed to the AAD, the Contractor (construction) and the Designer as well as whole-of-life costs.
- 10.15 The cost estimate has been informed by the competitive procurement process that has included:
- 10.15.1 An open market Expression of Interest process where the project Risk Cap, Reimbursable Cost Multipliers and Corporate Overhead Percentages were competed and locked in. The AAD engaged a Financial Auditor to provide independent verification of proponent Reimbursable Cost Multipliers;
  - 10.15.2 A competitive Request for Proposal process where two shortlisted proponents developed Program Proposals including binding prices (Target Outturn Costs/TOCs). The Project Owner relied on the mechanisms of the competitive process to ensure the TOCs developed by the Proponents represented value for money;
  - 10.15.3 The Request for Proposal phase included a 21 week interactive process for both Proponents, where the AAD, its advisors and the Independent Estimator reviewed and provided design and pricing feedback; and
  - 10.15.4 The pricing was evaluated against the AAD's Owners Estimate.
- 10.16 Under the Program Alliance framework, all costs are provided to the AAD on an open book basis.
- 10.17 The Program Alliance commercial framework includes a risk and / or reward regime to provide incentive to achieve win/win cost and performance outcomes. This include painshare/gainshare and key Performance Indicators for time, safety and other agree project objectives.

## Public Value

- 10.18 The public value associated with the program includes:
- 10.18.1 **Meeting scientific capability needs:** This Program will facilitate sustainment of Australia's research and monitoring capability in the Antarctic region;
  - 10.18.2 **Employment opportunities:** It is anticipated that construction activities will create additional jobs during the delivery of the works and in the fabrication, supply, and delivery of materials to Antarctica. Employment will ebb and flow over the course of the project. During the design phase approximately 25FTE will be engaged. This will taper down as construction ramps up with a peak of approximately 100FTE in the 26-27 period. It is expected the majority of employment opportunities will be for Australian workers. The sustainment of the aviation facilities and Antarctic stations will also support ongoing employment opportunities through future maintenance of the works; and
  - 10.18.3 **Health and Safety:** The program will reduce work health and safety risks to expeditioners, scientists and other persons visiting Antarctica posed by the condition of existing facilities and infrastructure.
- 10.19 The AIRP will modernise new and existing infrastructure, improve operations, and revitalise ongoing science programs. Antarctic research represents Australia's commitment to national and international science programs of high significance.
- 10.20 This proposal will renew Australia's capability in the Antarctic by continuing its vital scientific research and monitoring roles in Antarctica. Scientific programs undertaken in Antarctica include upper atmosphere physics, geosciences, medicine, meteorology, remediation, climate change and biological sciences.



- 10.21 The Department's support for research is consistent with the Australian Antarctic Strategy and 20 Year Action Plan, and more specifically, the Australian Antarctic Science Strategic Plan.
- 10.22 Much of the research undertaken in Antarctica and surrounding waters can be considered a public good in that it is either not undertaken for commercial benefit, relates to the protection and/or greater understanding of a World Heritage area or supports monitoring of and enhances the understanding of global systems. It is difficult to measure the benefit flowing from this research but, as with all research conducted under the Australian Antarctic Science Program, it is made available to researchers around the world and contributes to our greater understanding of critical elements of our earth systems. There continues to be a strong demand to undertake research of high scientific merit in Antarctica and it is expected that this demand will continue.
- 10.23 Renewed and refurbished scientific laboratories and workshops will benefit APS personnel from external agencies such as the Australian Radiation Protection and Nuclear Safety Agency, the Bureau of Meteorology and Geoscience Australia as well as visiting scientists from the numerous Australian universities who conduct research in Antarctica.
- 10.24 The redevelopment of the scientific research station and aviation facilities will incorporate pre-fabrication techniques which will create jobs both during its construction at Antarctica and during the prior manufacture of components in Australia.

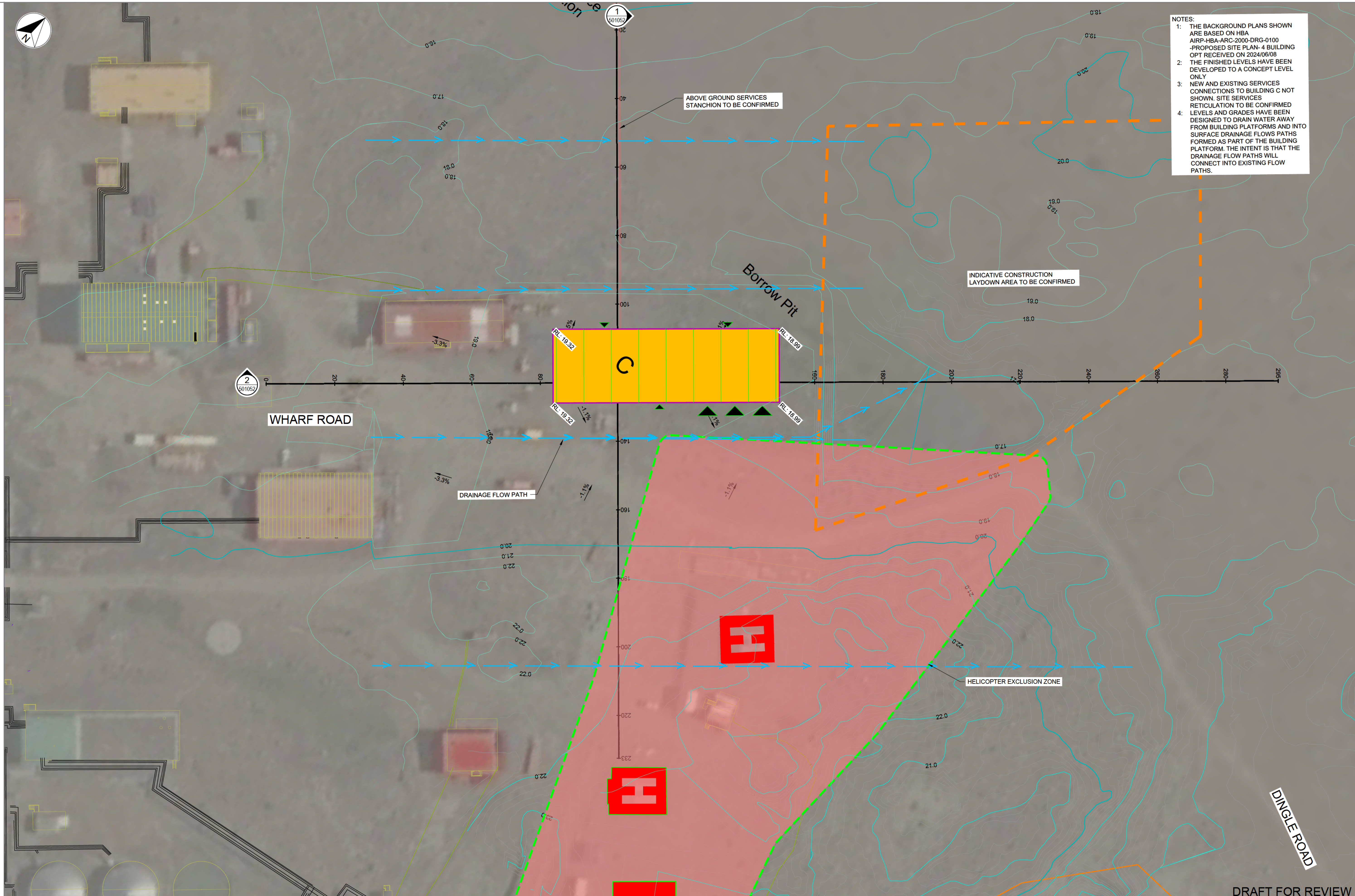
## **Revenue**

- 10.25 No revenue is expected to be derived from this program.
- 10.26 The Department encourages interest and continued investment in research by public universities, other research institutions and individual researchers. It does not charge for facility use or operating costs and hence provides in-kind support to the research effort. This approach is consistent with the Strategy and Action Plan.




## **11 APPENDICIES**

Appendix 1 – Reference Drawings

- NOTES:
- 1: THE BACKGROUND PLANS SHOWN ARE BASED ON HBA AIRP-HBA-ARC-2000-DRG-0100 -PROPOSED SITE PLAN-4 BUILDING OPT RECEIVED ON 2024/06/08
  - 2: THE FINISHED LEVELS HAVE BEEN DEVELOPED TO A CONCEPT LEVEL ONLY
  - 3: NEW AND EXISTING SERVICES CONNECTIONS TO BUILDING C NOT SHOWN. SITE SERVICES RETICULATION TO BE CONFIRMED
  - 4: LEVELS AND GRADES HAVE BEEN DESIGNED TO DRAIN WATER AWAY FROM BUILDING PLATFORMS AND INTO SURFACE DRAINAGE FLOWS PATHS FORMED AS PART OF THE BUILDING PLATFORM. THE INTENT IS THAT THE DRAINAGE FLOW PATHS WILL CONNECT INTO EXISTING FLOW PATHS.



DRAFT FOR REVIEW

|  |  |  |  |   |                             |            |   |                       |            |   |       |            |          |            |         |            |          |            |   |
|--|--|--|--|---|-----------------------------|------------|---|-----------------------|------------|---|-------|------------|----------|------------|---------|------------|----------|------------|---|
| <p>Client</p>  <p>Department of Climate Change, Energy, the Environment and Water<br/>Australian Antarctic Division</p>  | <p>Consultant</p>  <p>HUGHBROUGHTONARCHITECTS</p> | <p>Notes</p> <p>This Document and Design remains the copyright of WSP and Hugh Broughton Architects and cannot be reproduced in any way without prior consent. This drawing shall be read in conjunction with other contract documents, drawings and project specifications. No building work shall proceed until building consent has been granted for the work described. If there are any discrepancies in the documents please seek clarification before proceeding with any work. Do not scale off this drawing. Contractor must verify all dimensions and levels on site before commencing any work.</p> | <p>Revisions</p> <table border="1"> <tr> <td>1</td> <td>ISSUED FOR REFERENCE DESIGN</td> <td>28.10.2022</td> </tr> <tr> <td>2</td> <td>ISSUED FOR DISCUSSION</td> <td>20.06.2024</td> </tr> </table> | 1 | ISSUED FOR REFERENCE DESIGN | 28.10.2022 | 2 | ISSUED FOR DISCUSSION | 20.06.2024 | <p>SCALE @ A1= 1:500</p> <p>CIVIL</p> <table border="1"> <tr> <td>DRAWN</td> <td>D. DICKSON</td> </tr> <tr> <td>DESIGNED</td> <td>D. DICKSON</td> </tr> <tr> <td>CHECKED</td> <td>R. NOOAPII</td> </tr> <tr> <td>APPROVED</td> <td>R. NOOAPII</td> </tr> </table> | DRAWN | D. DICKSON | DESIGNED | D. DICKSON | CHECKED | R. NOOAPII | APPROVED | R. NOOAPII | <p>Project / Sheet</p> <p>ANTARCTIC INFRASTRUCTURE RENEWAL PROGRAM<br/>DAVIS RESEARCH STATION<br/>NEW UTILITY BUILDING BUILDING C PLATFORM<br/>FINISHED TOPOGRAPHY PLAN STAGE 1 B</p> <p>Project Code - Originator - Discipline - Sub-Area - Type - Number</p> <p>AIRP-WSP-CIV-2000-DRG-501016</p> <p>Revision</p> <p>2</p> |
| 1  | ISSUED FOR REFERENCE DESIGN  | 28.10.2022   |  |   |                             |            |   |                       |            |   |       |            |          |            |         |            |          |            |   |
| 2  | ISSUED FOR DISCUSSION  | 20.06.2024   |  |   |                             |            |   |                       |            |   |       |            |          |            |         |            |          |            |   |
| DRAWN  | D. DICKSON   |  |  |   |                             |            |   |                       |            |   |       |            |          |            |         |            |          |            |   |
| DESIGNED   | D. DICKSON   |  |  |   |                             |            |   |                       |            |   |       |            |          |            |         |            |          |            |   |
| CHECKED  | R. NOOAPII   |  |  |   |                             |            |   |                       |            |   |       |            |          |            |         |            |          |            |   |
| APPROVED   | R. NOOAPII   |  |  |   |                             |            |   |                       |            |   |       |            |          |            |         |            |          |            |   |



**NOTES:**

1. THE EARTHWORKS GEOMETRIC DESIGN AIMS TO PROVIDE A FORMED PLATFORM THAT FACILITATES THE FOLLOWING:
  - a. SAFE VEHICLE ACCESS TO ENABLE THE CONSTRUCTION OF BUILDINGS AND INSTALLATION OF SITE SERVICES
  - b. SAFE SPACE AROUND THE BUILDING STRUCTURE TO ENABLE BUILDING MAINTENANCE TASKS, SNOW CLEARANCE BY BULLDOZER AND DEMOLITION.
  - c. PASSIVE SNOW CLEARANCE BY MINIMISING WHERE POSSIBLE ABRUPT UNDULATIONS ACROSS THE SURFACE PROFILE AND TIE-IN WITH EXISTING GROUND.
  - d. POSITIVE SURFACE DRAINAGE SUCH THAT SNOW MELT RUNOFF CAN BE DIRECTED AWAY FROM THE STATION TARN, BUILDINGS AND KEY INFRASTRUCTURE.
  - e. OPTIMISE THE EARTHWORKS FOOTPRINT AND VOLUMES TO MINIMISE IMPACT TO THE ENVIRONMENT
2. THE EARTHWORKS DESIGN IS SUBJECT TO CHANGE FOLLOWING RWDI SNOW DRIFT ASSESSMENT.
3. UNLESS SHOWN OTHERWISE, ALL EARTHWORKS BATTER SLOPES OF 1:2 (V:H) HAS BEEN ADOPTED BASED ON THE ASSUMPTION THAT GROUND CONDITIONS AND FILL MATERIALS ARE ACCEPTABLE. FURTHER GEOTECHNICAL ANALYSIS TO VALIDATE BATTER SLOPES AND ROAD PAVEMENT DESIGN IS TO BE UNDERTAKEN.
4. THE EARTHWORKS VOLUMES PROVIDED HAVE BEEN DEVELOPED TO A CONCEPTUAL DESIGN LEVEL ONLY AND EXCLUDE ANY BULKING AND SHRINKAGE. FURTHER OPTIMISATION WILL BE REQUIRED IN PARALLEL WITH THE SITE LAYOUT DESIGN DEVELOPMENT.
5. SOME KEY EARTHWORKS DESIGN FACTORS TO BE CONSIDERED IN SUBSEQUENT DESIGN STAGES ARE:
  - a. WHERE REQUIRED, ADDITIONAL GEOTECHNICAL INVESTIGATIONS TO INFORM THE EARTHWORKS DESIGN.
  - b. EARTHWORKS CONSTRUCTION METHODOLOGY. OPTIONS TO CONSIDER:
    - i. DRILL AND BLAST
    - ii. RIPPING
    - iii. SURFACE MINER
    - c. OTHER CONSTRUCTION CONSIDERATIONS THAT MAY INFLUENCE THE EARTHWORKS DESIGN ARE:
      - i. SEQUENCING OF EARTHWORKS TO ALIGN WITH THE SITE LOGISTICS
      - ii. ROCK CRUSHER PRODUCTION CAPACITY AND EARTHWORKS
      - iii. STOCK PILING AREAS
      - iv. LAND CONTAMINATION
6. WHERE REQUIRED, ADDITIONAL EARTHWORKS FILL MATERIAL IS PROPOSED TO BE SOURCED FROM THE EXISTING QUARRY LOCATED IMMEDIATELY TO THE EAST OF THE STATION TARN. THE EXTENT AND VOLUMES TO BE QUARRIED ARE TO BE CONFIRMED WITH AAD.
7. THE EXISTING TOPOGRAPHIC CONTOURS SHOWN HAVE BEEN SOURCED FROM DATA PROVIDED BY AAD, 2018 NOVEMBER. SURFACE BUILT FROM 2m CONTOURS SITE WIDE AND 0.5m CONTOURS OVER THE CENTRAL BASE AREA.  
CHANGES TO THE SURFACE TOPOGRAPHY SINCE THIS SURVEY IS UNKNOWN AD HAVE NOT BEE INCLUDED AS PART OF THIS ASSESSMENT.  
  
A NEW TOPOGRAPHIC SURVEY IS REQUIRED. BULK EARTHWORKS TO BE REASSESSED BASE ON THIS NEW DATA
8. THIS EARTHWORKS PLAN SHOWS THE BULK CUT AND FILL EARTHWORKS COMPARING THE EXISTING GROUND TO THE PROPOSED GROUND.
9. THIS EARTHWORKS PLAN DOES NOT SHOW THE ADDITIONAL EXCAVATION TO SUBGRADE FOR BUILDING FOUNDATIONS AND PAVEMENTS.

- NOTES:**
1. THE BACKGROUND PLANS SHOWN ARE BASED ON HBA AIRP-HBA-ARC-2000-DRG-0100 -PROPOSED SITE PLAN- 4 BUILDING OPT RECEIVED ON 2024/06/08
  2. THE FINISHED LEVELS HAVE BEEN DEVELOPED TO A CONCEPT LEVEL ONLY
  3. NEW AND EXISTING SERVICES CONNECTIONS TO BUILDING C NOT SHOWN. SITE SERVICES RETICULATION TO BE CONFIRMED

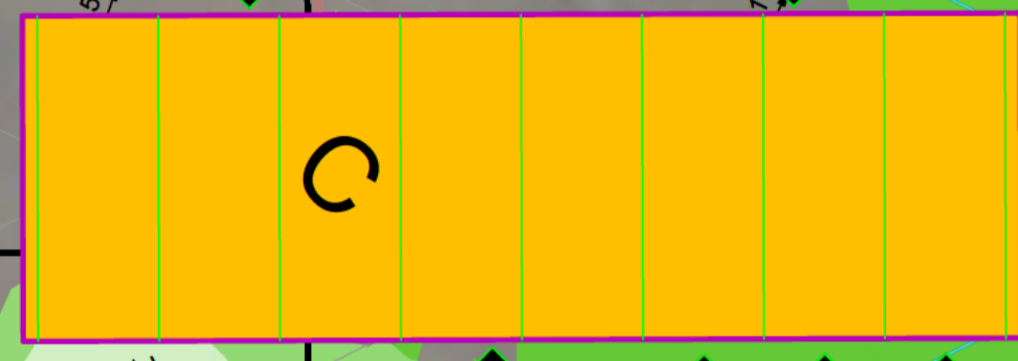
ABOVE GROUND SERVICES STANCHION TO BE CONFIRMED

INDICATIVE CONSTRUCTION LAYDOWN AREA TO BE CONFIRMED

WHARF ROAD

DRAIN LINE

Borrow Pit

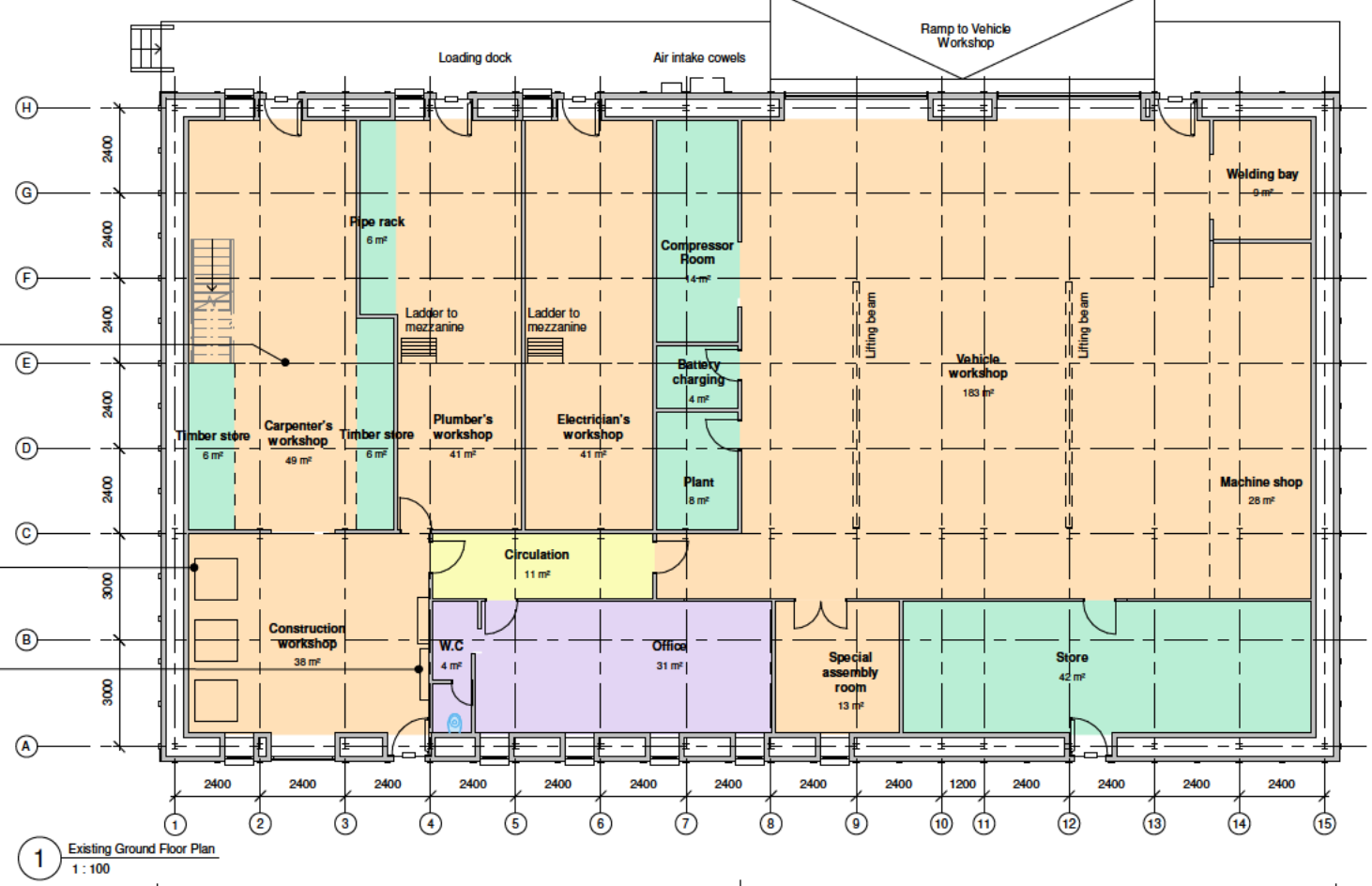


| NUMBER | COLOUR         | DEPTH RANGE (-CUT +FILL) | AREA (m <sup>2</sup> ) | VOLUME (m <sup>3</sup> ) |
|--------|----------------|--------------------------|------------------------|--------------------------|
| 1      | Red            | -4.000 - -3.000          | 40,771                 | 10878.853                |
| 2      | Dark Red       | -3.000 - -2.000          | 557,815                | 10612.405                |
| 3      | Light Red      | -2.000 - -1.000          | 1310,741               | 9735.496                 |
| 4      | Very Light Red | -1.000 - 0.000           | 2290,326               | 7778.386                 |
| 5      | Light Green    | 0.000 - +1.000           | 2604,890               | 5292.176                 |
| 6      | Medium Green   | +1.000 - +2.000          | 2236,087               | 2932.470                 |
| 7      | Dark Green     | +2.000 - +3.000          | 1842,187               | 542.835                  |

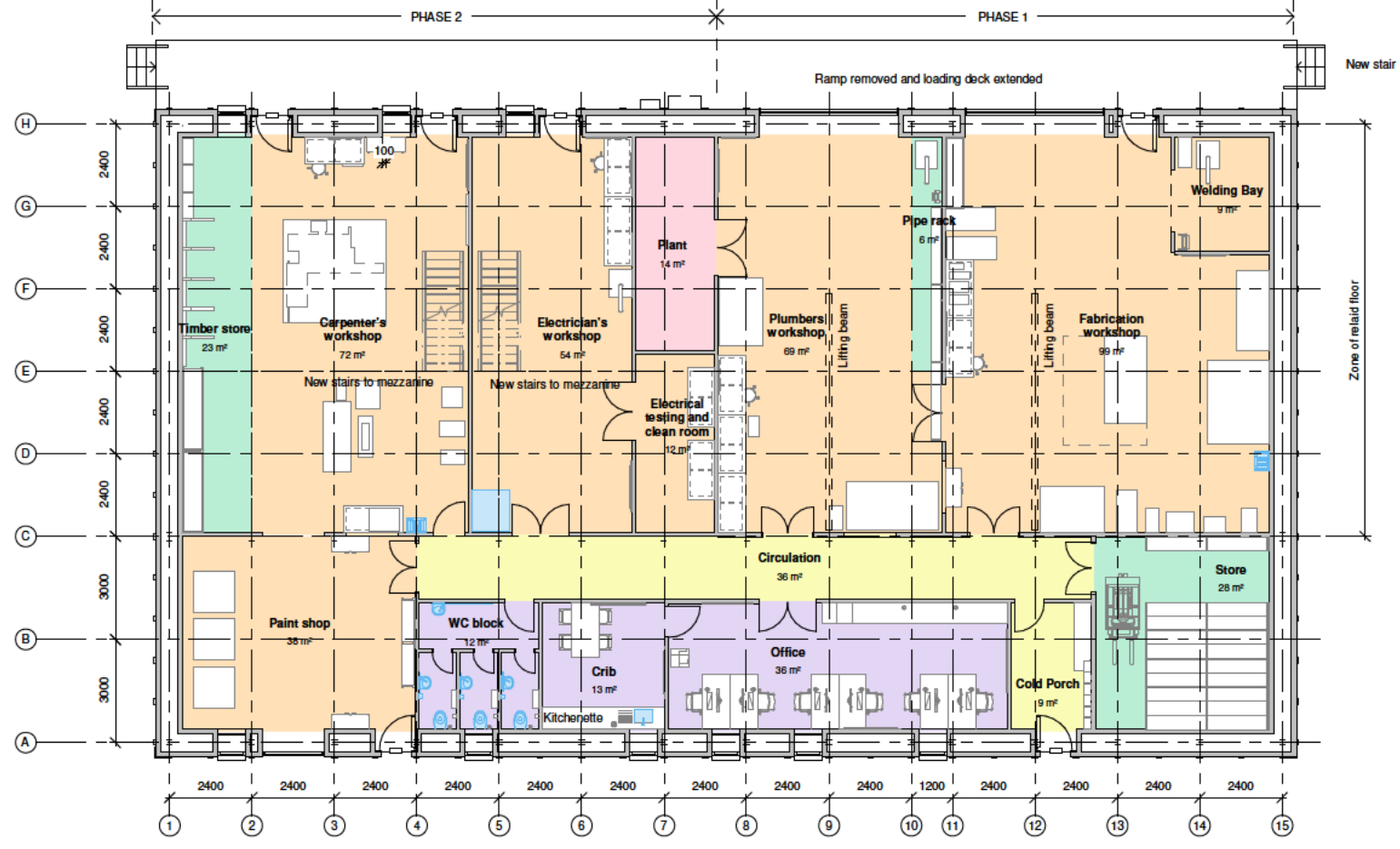
| Name                         | Cut Factor | Fill Factor | 2d Area      | Cut         | Fill        | Net               |
|------------------------------|------------|-------------|--------------|-------------|-------------|-------------------|
| Cut Fill Utility Building AB | 1.000      | 1.000       | 10639.18sq.m | 3147 Cu. M. | 9477 Cu. M. | 6329 Cu. M.<Fill> |
| Totals                       |            |             | 10639.18sq.m | 3147 Cu. M. | 9477 Cu. M. | 6329 Cu. M.<Fill> |

DINGLE ROAD

REFERENCE DESIGN



1 Existing Ground Floor Plan  
1:100



2 Proposed Ground Floor Plan  
1:100

EXISTING AREA SCHEDULE

| Department           | Name                   | Current Area       |
|----------------------|------------------------|--------------------|
| Corridor & Breakout  | Circulation            | 11 m <sup>2</sup>  |
| Station Services     | Office                 | 31 m <sup>2</sup>  |
| Station Services     | W.C                    | 4 m <sup>2</sup>   |
| Storage              | Store                  | 42 m <sup>2</sup>  |
| Storage              | Plant                  | 8 m <sup>2</sup>   |
| Storage              | Battery charging       | 4 m <sup>2</sup>   |
| Storage              | Compressor room        | 14 m <sup>2</sup>  |
| Storage              | Welding gas store      | Not Placed         |
| Storage              | Timber store           | 6 m <sup>2</sup>   |
| Storage              | Timber store           | 6 m <sup>2</sup>   |
| Storage              | Pipe rack              | 6 m <sup>2</sup>   |
| Trades & Engineering | Electrician's workshop | 41 m <sup>2</sup>  |
| Trades & Engineering | Plumber's workshop     | 41 m <sup>2</sup>  |
| Trades & Engineering | Carpenter's workshop   | 49 m <sup>2</sup>  |
| Trades & Engineering | Special assembly room  | 13 m <sup>2</sup>  |
| Trades & Engineering | Vehicle workshop       | 183 m <sup>2</sup> |
| Trades & Engineering | Welding bay            | 9 m <sup>2</sup>   |
| Trades & Engineering | Machine shop           | 28 m <sup>2</sup>  |
| Trades & Engineering | Construction workshop  | 38 m <sup>2</sup>  |
| Trades & Engineering | Construction workshop  | 38 m <sup>2</sup>  |
| GRAND TOTAL::        | 19                     | 534 m <sup>2</sup> |

PROPOSED AREA SCHEDULE

| Department           | Name                              | Current Area       |
|----------------------|-----------------------------------|--------------------|
| Corridor & Breakout  | Cold Porch                        | Not Placed         |
| Corridor & Breakout  | Circulation                       | 36 m <sup>2</sup>  |
| Corridor & Breakout  | Cold Porch                        | 9 m <sup>2</sup>   |
| Plant                | Plant                             | 14 m <sup>2</sup>  |
| Station Services     | WC block                          | 12 m <sup>2</sup>  |
| Station Services     | Office                            | 36 m <sup>2</sup>  |
| Station Services     | Kitchenette                       | Not Placed         |
| Station Services     | Crib                              | 13 m <sup>2</sup>  |
| Storage              | Store                             | 28 m <sup>2</sup>  |
| Storage              | Cleaner's store                   | Not Placed         |
| Storage              | Timber store                      | 23 m <sup>2</sup>  |
| Storage              | Pipe rack                         | 6 m <sup>2</sup>   |
| Storage              | Battery Charging                  | Not Placed         |
| Trades & Engineering | Carpenter's workshop              | 72 m <sup>2</sup>  |
| Trades & Engineering | Electrician's workshop            | 54 m <sup>2</sup>  |
| Trades & Engineering | Electrical testing and clean room | 12 m <sup>2</sup>  |
| Trades & Engineering | Plumbers workshop                 | 69 m <sup>2</sup>  |
| Trades & Engineering | Paint shop                        | 38 m <sup>2</sup>  |
| Trades & Engineering | Fabrication workshop              | 99 m <sup>2</sup>  |
| Trades & Engineering | Welding Bay                       | 9 m <sup>2</sup>   |
| GRAND TOTAL::        | 20                                | 531 m <sup>2</sup> |

DEPARTMENT

- Corridor & Breakout
- Plant
- Station Services
- Storage
- Trades & Engineering

Refurbishment of the workshop building will be required following completion of a new vehicle workshop facility. These works will ensure the successful operation of the building for a nominal further 15-years. The Non-owner Participant will develop a schedule of work to achieve this outcome. The work will be conducted in two phases to support the continued operation of the building. It is expected that the works will include, but will not be limited to:

- Structural reinforcement and column remedial works along gridline H
- Improvements to drainage around the building
- Removal of the vehicle ramp and extension of the loading dock
- Installation of an additional personnel stair at the east end of the loading dock
- Improvements to insulation to the floor with addition of resilient flooring to complete the works
- Remedial work to the floor slabs of the fabrication workshop
- Replacement of the workshop doors
- Remedial work to the cladding along the north elevation where the structure has been undermined
- Asbestos panel removal
- Alterations to the building layout to improve functionality, developed in consultation with the Project Owner. These alterations will create a fabrication workshop and allow re-organisation of the carpenter's workshop, electrician's workshop, plumber's workshop, office, stores and toilets
- Adjustments to building services to suit the new layout.



**Notes**  
This Document and Design remains the copyright of WSP and Hugh Broughton Architects and cannot be reproduced in any way without prior consent. This drawing shall be read in conjunction with other contract documents, drawings and project specifications. No building work shall proceed until building consent has been granted for the work described. If there are any discrepancies in the documents please seek clarification before proceeding with any work. Do not scale off this drawing. Contractor must verify all dimensions and levels on site before commencing any work.

- Revisions**
- 1 SILVER REVIEW
  - 2 ISSUED FOR REFERENCE DESIGN
  - 3 ISSUED FOR REFERENCE DESIGN
  - 4 REFERENCE DESIGN ADDENDUM
  - 5 INITIAL WORKS PACKAGE DRAFT ISSUE

10.10.2022:  
28.10.2022:  
18.11.2022:  
15.12.2022:  
06.08.2024:

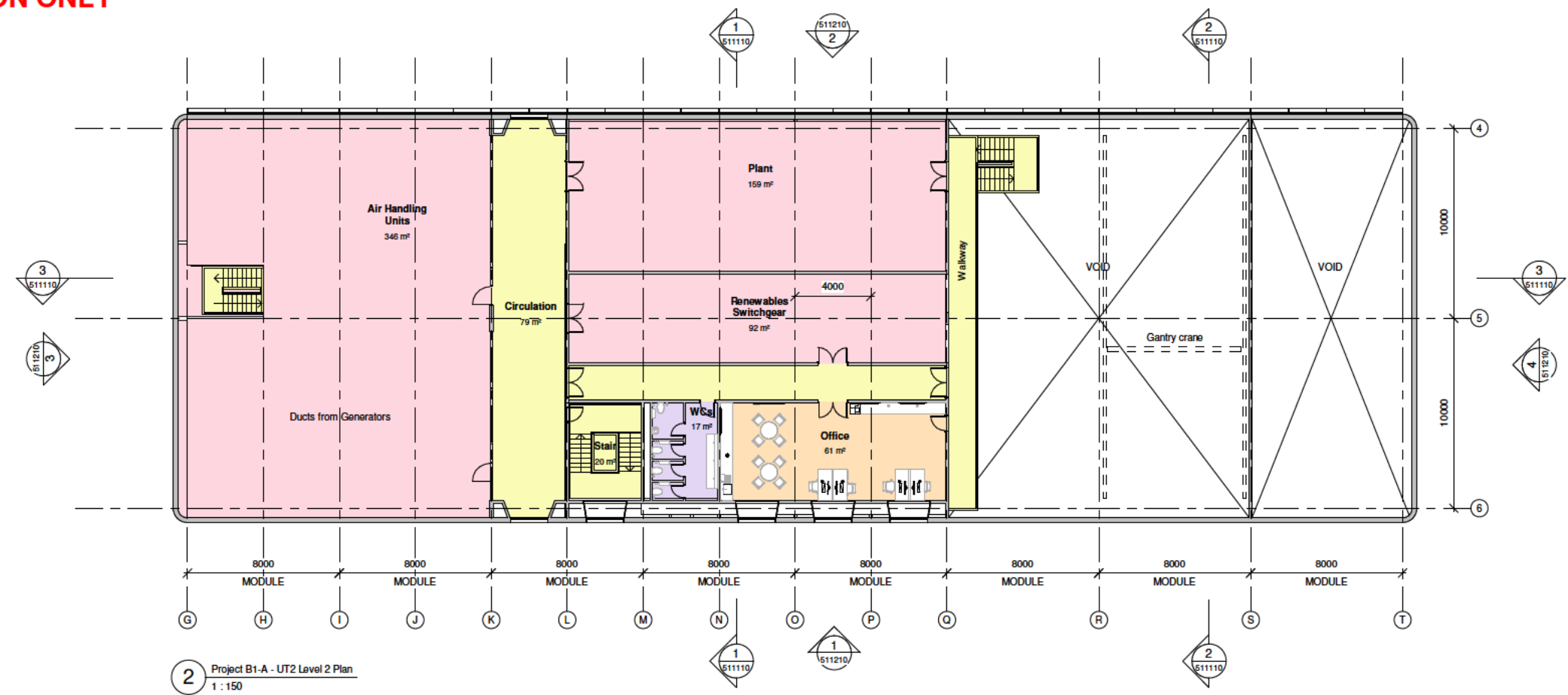
|          |             |
|----------|-------------|
| DRAWN    | JWADDINGTON |
| DESIGNED | H.BROUGHTON |
| CHECKED  | H.BROUGHTON |
| APPROVED | H.BROUGHTON |

ARCHITECTURE

SCALE @ A1- 1:100

Project / Sheet  
ANTARCTIC INFRASTRUCTURE RENEWAL PROGRAM  
DAVIS RESEARCH STATION  
TRADES WORKSHOP (WKS)  
EXISTING & PROPOSED GROUND FLOOR PLANS  
Project Code - Originator - Discipline - Sub-Area - Type - Number  
**AIRP-HBA-ARC-2000-DRG-051001**

DRAFT FOR INFORMATION ONLY



2 Project B1-A - UT2 Level 2 Plan  
1 : 150

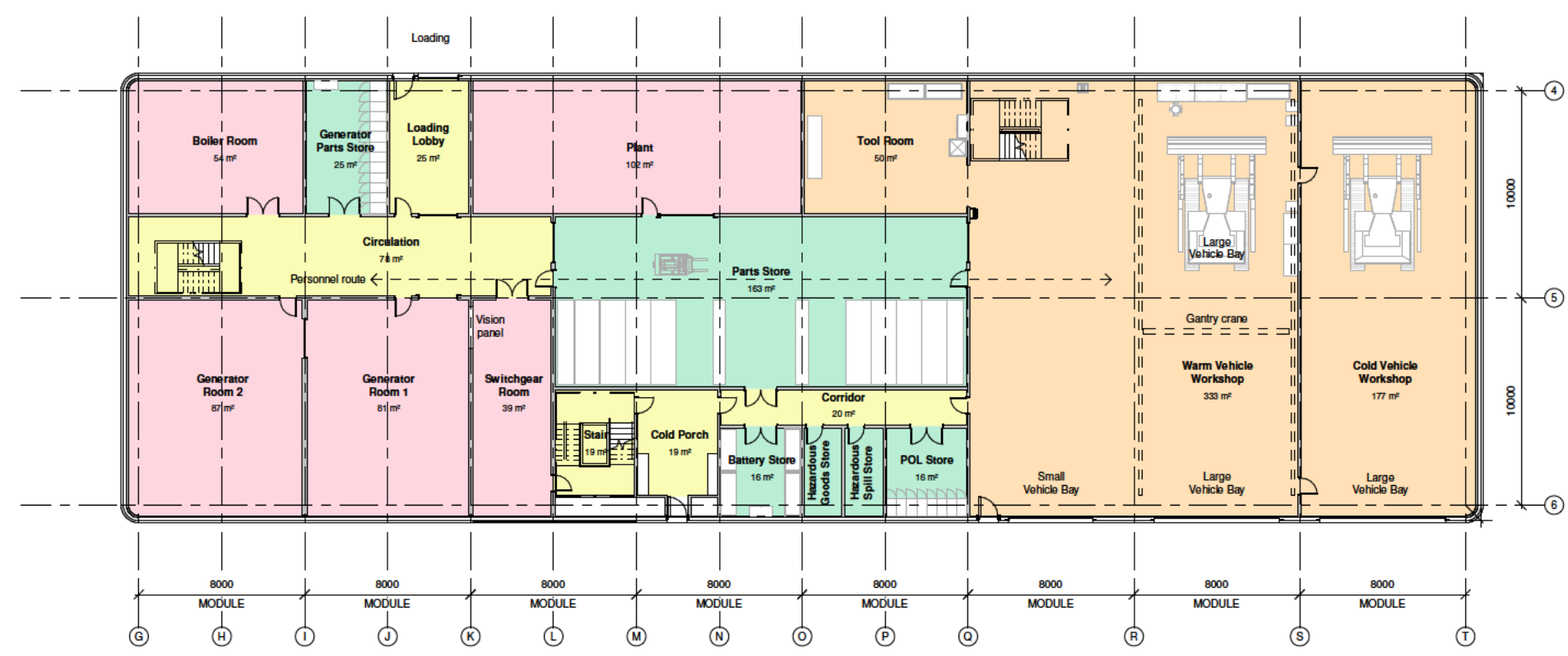
**DEPARTMENT**

- Corridor & Breakout
- Plant
- Station Services
- Trades & Engineering

Project B1-A - Utility Building 2 Area Schedule

| Department | Name | Area |
|------------|------|------|
|------------|------|------|

|                      |                       |        |
|----------------------|-----------------------|--------|
| UT2 00 FFL           |                       |        |
| Corridor & Breakout  | Circulation           | 78 m²  |
| Corridor & Breakout  | Cold Porch            | 19 m²  |
| Corridor & Breakout  | Corridor              | 20 m²  |
| Corridor & Breakout  | Loading Lobby         | 25 m²  |
| Corridor & Breakout  | Stair                 | 19 m²  |
| Plant                | Boiler Room           | 54 m²  |
| Plant                | Generator Room 1      | 81 m²  |
| Plant                | Generator Room 2      | 87 m²  |
| Plant                | Plant                 | 102 m² |
| Plant                | Switchgear Room       | 39 m²  |
| Storage              | Battery Store         | 16 m²  |
| Storage              | Generator Parts Store | 25 m²  |
| Storage              | Hazardous Goods Store | 8 m²   |
| Storage              | Hazardous Spill Store | 8 m²   |
| Storage              | Parts Store           | 163 m² |
| Storage              | POL Store             | 16 m²  |
| Trades & Engineering | Cold Vehicle Workshop | 177 m² |
| Trades & Engineering | Tool Room             | 50 m²  |
| Trades & Engineering | Warm Vehicle Workshop | 333 m² |
| UT2 02 FFL           |                       |        |
| Corridor & Breakout  | Circulation           | 36 m²  |
| Corridor & Breakout  | Circulation           | 79 m²  |
| Corridor & Breakout  | Stair                 | 20 m²  |
| Plant                | Air Handling Units    | 346 m² |
| Plant                | Plant                 | 159 m² |
| Plant                | Renewables Switchgear | 92 m²  |
| Station Services     | WCs                   | 17 m²  |
| Trades & Engineering | Office                | 61 m²  |



1 Project B1-A - UT2 Level 1 Plan  
1 : 150

**DEPARTMENT**

- Corridor & Breakout
- Plant
- Storage
- Trades & Engineering



**Notes**

This Document and Design remains the copyright of WSP and Hugh Broughton Architects and cannot be reproduced in any way without prior consent. This drawing shall be read in conjunction with other contract documents, drawings and project specifications. No building work shall proceed until building consent has been granted for the work described. If there are any discrepancies in the documents please seek clarification before proceeding with any work. Do not scale off this drawing. Contractor must verify all dimensions and levels on site before commencing any work.

- Revisions**
- REFERENCE DESIGN ADDENDUM
  - INITIAL WORKS PACKAGE DRAFT ISSUE
  - INITIAL WORKS PACKAGE DRAFT ISSUE

15.12.2022;  
30.07.2024;  
01.08.2024

|          |             |
|----------|-------------|
| DRAWN    | J.LETTICE   |
| DESIGNED | J.LETTICE   |
| CHECKED  | H.BROUGHTON |
| APPROVED | H.BROUGHTON |

**ARCHITECTURE**

SCALE @ A1+ 1 : 150

Project / Sheet  
**ANTARCTIC INFRASTRUCTURE RENEWAL PROGRAM**  
**DAVIS RESEARCH STATION**  
**UTILITY BUILDING 2**  
**INITIAL WORKS PACKAGE - UTB PLANS**

Project Code - Originator - Discipline - SubArea - Type - Number  
**AIRP-HBA-ARC-2000-DRG-511010**

Revision  
**3**