NNO3 Inauguration FAQ

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The European Space Agency (ESA) is expanding its deep space communication capabilities with the construction of a new 35-m, deep space antenna. This new infrastructure aims to support current and upcoming ESA deep-space missions and their fast-growing data demands spanning scientific, exploration and space safety mission fleets, while also enhancing international collaboration and bring enhanced value to European scientists.

On Saturday, 4 October 2025, ESA will inaugurate its second deep space antenna at its New Norcia ground station in Western Australia. The inauguration will bring together key representatives from ESA, Australian authorities, international partners, space industries and media to celebrate the achievements and strategic importance of deep space communication.

1. What is ESA's Estrack network?

ESA's tracking station network – Estrack – is a global system of ground stations providing links between satellites in orbit and the **European Space Operations Centre** (ESOC) in Darmstadt, Germany.

Inaugurated in 1975, the Estrack network now comprises six core stations on three continents and enables Europe to independently fly any type of mission and track spacecraft and launchers through any phase of their flight, in any orbit, from lift-off to end of mission. The Estrack network also collaborates and uses services from a variety of institutional and commercial partner networks.

The essential task of ESA ground stations is to communicate with spacecraft, transmitting commands and receiving scientific data and spacecraft status information. It can track spacecraft almost anywhere, on every Earth orbit, at the scientifically important Sun-Earth Lagrange points, or deep into our Solar System. Estrack also provides critical tracking services to European launchers departing from Europe's spaceport in Kourou, French Guiana.

ESA's ground stations boost value for European scientists and their engagement with the international scientific community and ensure that ESA plays a leading role in fostering collaboration across all domains of Earth observation, space science, exploration and space safety.

Estrack is not just ESA's link to valuable science data - it is a vital tool for global space collaboration, and cross-support agreements with our international partners enable mutual benefits and efficiencies.

Estrack is a state-of-the-art network, pushing technology boundaries to stay at the forefront of deep space communications. The network features advanced equipment able to meet the very high-end performance demands required by ESA missions and ensuring global communication with a wide range of ESA and partner missions. The network is expanding with the construction of a new deep space 35m-diameter antenna at its **New Norcia** ground station in Western Australia.

2. Why is ESA building a new antenna at New Norcia?

Today and in the future, ESA is flying a growing number of increasingly sophisticated spacecraft:

- to explore all corners of our Solar System, its planets, moons and asteroids,
- to observe and better understand stars, exoplanets, our galaxy and the nature of our Universe,
- to study and watch closely over our active star, and
- to go out to asteroids, learn from them and improve our capacity for planetary defence.

These spacecraft are gathering immense quantities of first-ever scientific information from millions and even billions of kilometres away, including fantastic images and stunning new data from alien worlds, and all that data must arrive back on Earth without fail.

Over the next five years, ESA's Estrack ground station network is projected to experience a 25% overload in deep-space tracking capacity. To secure Europe's independent ability to fly any type of mission, Estrack is being expanded with the construction of a new deep-space antenna joining the existing one at New Norcia station, Australia, to help meet the Agency's fast increasing data download needs.

This will ensure that European scientists can continue exploring anywhere, that new missions can help protect our planet and that ESA remains at the forefront of international collaboration while fostering technological excellence in deep space communications. With Estrack, ESA is developing and maintaining strategic European infrastructure worldwide to ensure Europe's ability to access and use space for the benefit of its citizens, its scientists and its economies.

3. Why was New Norcia, Western Australia, chosen as the location?

The Estrack presence in Australia is a key element of ESA's Asia-Pacific strategy and ensures the Agency maintains a diverse array of international partnerships.

The antenna's location in Western Australia provides a strategic geographical position for around-the-clock coverage of deep space missions. It is a perfect complement to ESA's sites in Malargüe (Argentina) and Cebreros (Spain). Together, the three stations, situation about 120° apart, provide global, 360° coverage for ESA missions anywhere in the Solar System.

Constructing the antenna at an existing site allows for cost-effective development and operations. ESA is also planning future expansion at its deep space antenna sites in Argentina to further boost capacity as the mission load increases.

Western Australia is also the location over which payloads launching from Europe's Spaceport in Kourou, French Guiana, separate from their launcher. Located a few hundred meters from the deep space antennas, a smaller, agile 4.5-m dish tracks Vega-C and Ariane 6 launches and acquires critical telemetry used to monitor their status.

The station hosts a custom-built transponder antenna to calibrate the measurements of ESA's Biomass mission, launched in 2025.

4. What are the technical specifications of the new antenna?

Like ESA's existing deep-space stations, which communicate well beyond 2 million km in space, the New Norcia 3 antenna incorporates cutting-edge cryocooling, advanced clock and timing systems, AI, and world-class radio-frequency communication tools and techniques to support deep space communications.

The New Norcia 3 antenna is designed to operate in X-, K- and Ka-band in reception and transmission. It features a 35m-diameter dish and its structure has been optimised to maintain the parabolic shape even under worst case wind. Its servo system will ensure that the antenna will point in the direction of the spacecraft with a precision better than 0.005 deg.

ESA's fourth deep space antenna incorporates advanced deep-space communication technology, including several components cryogenically cooled to around -263°C, near absolute zero. This sensitivity allows it to detect extremely weak signals from distant spacecraft and to maximise data return. For transmission in X-band, a 20kW radio-frequency amplifier enables communication with spacecraft millions and even billions of kilometres away from Earth. The new antenna is furthermore prepared to transmit with a 100kW amplifier required e.g. for spacecraft emergencies.

In line with ESA’s sustainability goals, a second photovoltaic power generation system with a maximum output of 100 kW is planned for deployment in 2025 and will extend the existing 250 kW photovoltaic plant, which was built in 2017.

5. Who is building the new antenna?

Construction is led by European industry. The project’s prime co-contractors are Thales Alenia Space (France) and Schwartz Hautmont Construcciones Metálicas (Spain).

Local Australia industrial partners were responsible for upgrading the necessary infrastructure to prepare the New Norcia site for a second deep space antenna, such as roads, power and data.

Australia’s national science agency, CSIRO, has been ESA’s local partner for operations and maintenance since 2019 and will likewise be responsible for the additional new antenna.

6. When will the new antenna be operational?

Construction began in June 2022. The antenna is expected to enter operation in early 2026. This timeline aligns with the support requirements for upcoming missions, ensuring that ESA's deep space communication network remains robust and capable of supporting Europe’s scientific, exploration and space safety ambitions.

7. Who will benefit from the new antenna? How does this antenna enhance international collaboration?

The main beneficiary of the new antenna will be ESA’s current flagship missions flown as part of the Agency's scientific, exploration and space safety fleets, including Juice, Solar Orbiter, BepiColombo, Mars Express, Euclid, ExoMars Trace Gas Orbiter and Hera, and later missions including Plato, Ramses, Envision, and Vigil.

The antenna will also serve ESA's efforts towards international collaboration, and cross-support arrangements with the Agency's partners enable mutual benefit and boost efficiencies for all.

The new antenna facilitates cross-support arrangements with other space agencies such as JAXA and NASA, whose Nancy Grace Roman space telescope will be supported by Estrack. It will provide support on a case-by-case basis to ISRO, CNSA, other national space agencies and commercial spaceflight, boosting science return and operational efficiency for all parties involved. Typically, in exchange for Estrack station time, a partner will return to ESA a similar amount of ground station support from their network, share scientific data from a mission with European scientists or otherwise provide value to ESA.

8. What role do Australian organisations play in the project?

ESA's new deep space antenna in Western Australia is a cooperation effort together with the Australian Space Agency. Australia's national science agency, CSIRO, has been ESA's local partner for operations and maintenance since 2019 and will likewise be responsible for day-to-day operation of the new antenna. A local 14-person team supports the operation of the two deep space antennas, as well as that of the launcher tracking antenna and Biomass calibration transponder.

The involvement of these organisations ensures the reliable operation of the new antenna and supports Australia's ambitions in the space sector.

9. How does this project enhance ESA's presence in the Asia-Pacific region?

The Estrack station at New Norcia, Western Australia, demonstrates ESA's strong engagement in the Asia-Pacific region and especially Australia, part of the long-term cooperation between ESA and Australia in the space domain. It enables significant economic, technology and scientific benefits for both partners, and will pave the way for further collaboration in areas such as communications, space safety and mission operations.

By establishing a second deep space antenna in Australia, ESA is reinforcing its strategic footprint in the Asia-Pacific area. ESA's collaboration with Australia facilitates collaboration with other regional partners. Australia, for example, serves as a gateway for European Copernicus Earth observation data distribution to the Asia-Pacific region.

10. What is the history of ESA's ground stations in Australia?

ESA has been collaborating with Australia in a variety of space projects over many years.

Tracking and operations support

Initially installed at Carnarvon, ESA's first 15-m dish ground station in Australia provided acquisition and launch support for Ariane launchers as well as tracking and monitoring of payloads during transfer orbit. With the closure of Carnarvon in 1986, the facility was disassembled, relocated and re-commissioned in the vicinity of the city of Perth. In 2015, this station was decommissioned due to urban expansion and growing radio interference. The antenna was acquired by Portugal, and was relocated to Santa Maria island in the Azores in 2017, where it is now operated by the Portuguese Space Agency.

The construction of ESA's first 35-m deep space antenna, designated NNO-1, and located at New Norcia, started in March 2000 and was completed in 2003.

In February 2016, a 4.5-m dish designated NNO-2 was inaugurated. It acts as an acquisition aid for the 35-m dish for fast-moving satellites and launch vehicles during their launch and early orbit stage, and replaces the functionality previously provided by ESA's Perth station.

In December 2019, ESA announced plans to build a second 35m-deep space antenna, due to enter operation in 2026, at New Norcia to provide coverage for upcoming ESA missions.

For the Biomass spacecraft, launched in April 2025, a 435 MHz (also called P-band) calibration transponder was commissioned. This 4-m antenna will enable calibration of the spacecraft during its mission to map Earth's bio-matter.

Astronaut training

Katherine Bennell-Pegg, Director of Space Technology at the Australian Space Agency, was trained at the European Astronaut Centre near Cologne, Germany. She undertook the Basic Training alongside the European career astronauts of the 2022 class, and graduated with them, in April 2024.

11. What is the nature of the treaties governing the relationship between Australia and the European Space Agency?

The relationship between Australia and the European Space Agency is governed by an Implementing Arrangement with the Department of Innovation, Industry, Science and Research of the Government of Australia (DIISR) concerning ESA's Space Tracking Activities in Australia (ESA/LEG/392) signed 5 October 2011 which has been in effect since 23 August 2012, upon entry into force of the Agreement between the Agency and the Australia Government for a Co-operative Space Vehicle Tracking Program (ESA/LEG/391).

It covers NNO-1, NNO-2 and NNO-3 and related extended facilities, as well as the (not ESA-owned) facilities in Perth, Dogana and the University of South Australia in Adelaid providing space tracking services.