Chapter 10 Approach to impact assessment

The purpose of this chapter is to describe the approach to the impact assessment for the proposed airspace and flight path design for the Western Sydney International (Nancy-Bird Walton) Airport (the project) in line with the relevant requirements of the Airports Act 1996 (including the Airport Plan) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The statutory framework applicable to the project incorporating the Environmental Impact Statement (EIS) process is provided in Chapter 5 (Statutory context). The detailed methodologies are described in individual technical papers and summarised in Chapter 11 to Chapter 23.

10.1 Introduction

Part C of this EIS presents the core of the impact assessment and covers the range of relevant effects associated with the project for single runway operations across the 3 chosen assessment years (where relevant – refer to Section 10.5).

While an approval is not required under Part 3, Division 1 of the EPBC Act, the assessment of the project still needs to consider the impacts on the 'whole of the environment', meaning the assessment is not limited to the consideration of Matters of National Environmental Significance (MNES) (refer to EIS Guidelines (EPBC 2022/9143) section 7.3.3). The EIS Guidelines for the project (refer to Appendix C (EIS Guidelines)) also require consideration of the *World Heritage Advice Note: Environmental Assessment* (IUCN, 2013) (IUCN Guidelines). As the IUCN Guidelines have been superseded, the assessment has also considered *Guidance and Toolkit for impact assessments in a World Heritage Context* (UNESCO, 2022a).

10.2 Approach

The approach to impact assessment for this EIS has been to:

- identify key potential impacts and risks to be considered in the EIS for the project with consideration to the 'whole of the environment'
- capture and address the relevant requirements of the Airports Act and the EPBC Act in the EIS, those in accordance with the EIS Guideline requirements, "…a description of all of the relevant impacts of the action (including direct, indirect, facilitated and cumulative), including the magnitude, duration and frequency of the impacts."

Through this approach, key potential impacts for each key aspect were identified for consideration as part of detailed impact assessments (technical papers), which may be in addition to those specified by the EIS Guidelines. A separate assessment of impacts on World Heritage was conducted to specifically meet the IUCN Guidelines.

The assessment has also been informed by the following guidelines:

- Matters of National Environmental Significance, Significant impact guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999* (Significant impact guidelines 1.1) (Commonwealth of Australia, 2013a)
- Actions on, or impacting upon Commonwealth land, and actions by Commonwealth agencies, Significant impact guidelines 1.2 *Environment Protection and Biodiversity Conservation Act 1999* (Significant impact guidelines 1.2) (Commonwealth of Australia, 2013b).

10.2.1 Impacts on MNES

Significant impact guidelines 1.1 provide a definition of 'significant impact' and identify a set of criteria for each MNES to determine whether the project is likely to have such an impact. They also outline the approach to take where there is scientific uncertainty about the potential impacts. A checklist of the 9 MNES, and correlating EIS chapter/s that provide the assessment information is provided in Table 10.1.

Table 10.1 EPBC Protected Matters checklist

EPBC Act controlling provision	Relevant EIS Chapters
Matters of national environmental significance	
World Heritage properties	Chapter 16 (Biodiversity), Chapter 17 (Heritage), Chapter 23 (Matters of National Environmental Significance).
National Heritage Places	Chapter 17 (Heritage) and Chapter 23 (Matters of National Environmental Significance).
Wetlands of International importance	Chapter 16 (Biodiversity) and Chapter 23 (Matters of National Environmental Significance).
Listed threatened ecological communities	Chapter 16 (Biodiversity) and Chapter 23 (Matters of National Environmental Significance).
Listed threatened species	Chapter 16 (Biodiversity) and Chapter 23 (Matters of National Environmental Significance).
Listed migratory species*	Chapter 16 (Biodiversity) and Chapter 23 (Matters of National Environmental Significance).
Great Barrier Reef Marine Park	This aspect is not applicable as the project is located over 900 km from the Great Barrier Reef Marine Park.
Nuclear action (including uranium mining)	Not applicable as the project is located 83 km from a Commonwealth marine area and there is no impact pathway from the project to that area.
Commonwealth marine areas	Commonwealth marine areas are located within 45 nm (83 km) of the Airport Site. However, the project would not impact on a Commonwealth marine area.
A water resource, in relation to coal seam gas development and large coal mining development	This aspect is not applicable as the project does not include coal seam gas development or large coal mining development.
Other relevant protected matters	
The environment of Commonwealth land	Various Chapters in part C of the EIS, as the project provides flight paths over the WSI site and other Commonwealth Land.
Commonwealth action	This project relates to a Commonwealth action.
Commonwealth Heritage Places	Chapter 17 (Heritage).
Listed marine species; Critical habitats; Commonwealth reserves – terrestrial; and Nationally important wetlands	Chapter 16 (Biodiversity).

*listed under signed international conventions and agreements including Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), China-Australia Migratory Bird Agreement (CAMBA) and Japan-Australia Migratory Bird Agreement (JAMBA)).

Where an "action" under the EPBC Act does not trigger a need for approval under Part 3, Division 1 of the EPBC Act for impacts on listed threatened species or ecological communities (or fall within one of several other exceptions in section 197 of under the EPBC Act but may kill, injure, take, trade, keep or move a member of a listed threatened species or ecological community, a member of a listed migratory species, or a member of a listed marine species in or on a Commonwealth area, a permit may be required under Part 13 of the EPBC Act (refer to Chapter 16 (Biodiversity)).

10.2.2 Impacts on 'whole of the environment'

Significant impact guidelines 1.2 consider the whole of the environment impacts to be the "*total adverse impact of the action in the entire context of the environment which will be impacted by the project, particularly those elements of the environment which are sensitive or valuable*."

These guidelines are relevant to the project as they apply to:

- any person who proposes to take an action which is either situated on Commonwealth land or which may impact on Commonwealth land
- representatives of Commonwealth agencies who propose to take an action that may impact on the environment anywhere in the world.

An 'action' includes a project, development, undertaking, activity, or series of activities.

The guidelines identify a set of criteria against the following aspects to determine whether the project is likely to have a 'significant' impact on the environment:

- landscapes and soils
- coastal landscapes and processes
- ocean forms, ocean processes and ocean life
- water resources
- pollutants, chemicals and toxic substances
- plants
- animals
- people and communities
- heritage.

A checklist with the specific significance criteria and correlating EIS chapter/s that provide the assessment information is provided in Table 10.2. A summary assessment against each of the relevant significance criteria is provided in Chapter 25 (Conclusion).

Table 10.2 Whole of environment checklist

Environmental element	Relevant EIS chapters
Impacts on landscapes and soils	
Is there a real chance or possibility that the action will:	
• substantially alter natural landscape features	Chapter 15 (Landscape and visual amenity).
• cause subsidence, instability or substantial erosion	This aspect is not applicable as the project does not involve any ground-side works.
• involve medium or large-scale excavation of soil or minerals?	This aspect is not applicable as the project does not involve any excavation.

Environmental element	Relevant EIS chapters
Impacts on coastal landscapes and processes	
Is there a real chance or possibility that the action will: • alter coastal processes, including wave action, sediment movement or accretion, or water circulation patterns • permanently alter tidal patterns, water flows or water quality in estuaries • reduce biological diversity or change species composition in estuaries or • extract large volumes of sand or substantially destabilise sand dunes?	Not applicable as the WSI runway is located approximately 41 kilometres (km) from the coast.
Impacts on ocean forms, ocean processes and ocean life	
Is there a real chance or possibility that the action will: • reduce biological diversity or change species composition on reefs, seamounts or in other sensitive marine environments • alter water circulation patterns by modification of existing landforms or the addition of artificial reefs or other large structures • substantially damage or modify large areas of the seafloor or ocean habitat, such as sea grass • release oil, fuel or other toxic substances into the marine environment in sufficient quantity to kill larger marine animals or alter ecosystem processes • release large quantities of sewage or other waste into the marine environment?	This aspect is not applicable as the WSI runway is located approximately 41 kilometres (km) from the coast. Indirect impacts on the environment from, for example, fuel jettisoning (fuel dumping), are assessed as per the pollutants, chemicals and toxic substances criteria further below in this table.
Impacts on water resources	
Is there a real chance or possibility that the action will: • measurably reduce the quantity, quality or availability of surface or ground water • channelise, divert or impound rivers or creeks or substantially alter drainage patterns or • measurably alter water table levels?	Risks to water quality due to aircraft operations (e.g. through fuel jettisoning) has been considered in Chapter 13 (Aircraft hazard and risk).
Pollutants, chemicals, and toxic substances	
Is there a real chance or possibility that the action will:	
• generate smoke, fumes, chemicals, nutrients, or other pollutants which will substantially reduce local air quality or water quality	Chapter 12 (Air quality and greenhouse gas).
• result in the release, leakage, spillage, or explosion of flammable, explosive, toxic, radioactive, carcinogenic, or mutagenic substances, through use, storage, transport, or disposal	Chapter 13 (Aircraft hazard and risk) Chapter 16 (Biodiversity) Chapter 20 (Human health).

Environmental element	Relevant EIS chapters
• increase atmospheric concentrations of gases which will contribute to the greenhouse effect or ozone damage	Chapter 12 (Air quality and greenhouse gas).
• substantially disturb contaminated or acid-sulphate soils?	This aspect is not applicable as the project does not involve any disturbance of soils.
Impacts on plants	
Is there a real chance or possibility that the action will: • involve medium or large-scale native vegetation clearance • involve any clearance of any vegetation containing a listed threatened species which is likely to result in a long-term decline in a population or which threatens the viability of the species • introduce potentially invasive species • involve the use of chemicals which substantially stunt the growth of native vegetation • involve large-scale controlled burning or any controlled burning in sensitive areas, including areas which contain listed threatened species?	This aspect is not applicable as the project is limited to airspace and does not involve any of these activities that may impact on plants. Chemical use would be limited to that required to operate aircraft. It is not anticipated that this use would stint the growth of native vegetation.
Impacts on animals	
Is there a real chance or possibility that the action will:	
• cause a long-term decrease in, or threaten the viability of, a native animal population or populations, through death, injury or other harm to individuals	Chapter 16 (Biodiversity).
• displace or substantially limit the movement or dispersal of native animal population	
• substantially reduce or fragment available habitat for native species	
• reduce or fragment available habitat for listed threatened species which is likely to displace a population, result in a long-term decline in a population, or threaten the viability of the species	
• introduce exotic species which will substantially reduce habitat or resources for native species	This aspect is not applicable as the project does not involve any ground-side works that may introduce exotic species.
• undertake large-scale controlled burning or any controlled burning in areas containing listed threatened species	Not applicable as the project does not involve any large-scale controlled burning.

Environmental element	Relevant EIS chapters
Impact on people and communities	
Is there a real chance or possibility that the action will:	
• substantially increase demand for, or reduce the availability of, community services or infrastructure which have direct or indirect impacts on the environment, including water supply, power supply, roads, waste disposal, and housing	Chapter 13 (Aircraft hazard and risk) Chapter 18 (Social) Chapter 20 (Human health).
• affect the health, safety, welfare or quality of life of the members of a community, through factors such as noise, odours, fumes, smoke, or other pollutants	Chapter 11 (Aircraft noise) Chapter 12 (Air quality and greenhouse gas) Chapter 13 (Aircraft hazard and risk) Chapter 18 (Social) Chapter 20 (Human health).
• cause physical dislocation of individuals or communities	Chapter 14 (Land use) Chapter 18 (Social).
• substantially change or diminish cultural identity, social organisation or community resources	Chapter 17 (Heritage) Chapter 18 (Social).
Impacts on heritage	
Is there a real chance or possibility that the action will:	
• permanently destroy, remove or substantially alter the fabric (physical material including structural elements and other components, fixtures, contents, and objects) of a heritage place	Chapter 17 (Heritage) Chapter 23 (Matters of National Environmental Significance).
• involve extension, renovation, or substantial alteration of a heritage place in a manner which is inconsistent with the heritage values of the place	
• involve the erection of buildings or other structures adjacent to, or within important sight lines of, a heritage place which is inconsistent with the heritage values of the place	
• substantially diminish the heritage value of a heritage place for a community or group for which it is significant	
• substantially alter the setting of a heritage place in a manner which is inconsistent with the heritage values of the place	
• substantially restrict or inhibit the existing use of a heritage place as a cultural or ceremonial site?	

10.3 Impact scoping

The first step of the impact assessment process was to identify the key aspects of the environment that would be subject to detailed assessment as part of the EIS.

The scope of relevant aspects was informed by:

- the requirements of Condition 16 of the Airport Plan
- EIS Guidelines for the project as presented in Appendix C
- preliminary environmental assessments conducted as part of the design process to date (see Chapter 6 (Project development and alternatives))
- the 'environmental context' of the project as described in the Significant Impact Guidelines 1.2
- previous assessments for runway approvals.

The key aspects for this EIS were determined to be:

- aircraft noise
- air quality and greenhouse gas (air pollution)
- aircraft hazards and risk
- land use
- landscape and visual amenity
- biodiversity (impacts to fauna)
- heritage (Aboriginal and historic, including the GBMA)
- people and communities, covered under:
  - social
  - economic
  - human health
- cumulative impacts
- MNES (including World heritage and National heritage values).

The key aspects identified by the EIS Guidelines were informed by the referral (EPBC 2022/9143), which was submitted to support the requirements of Section 161 of the EPBC Act and Condition 16 of the Airport Plan in 2021.

10.4 Impact assessment method

10.4.1 Defining the study area

In accordance with Significant impact guidelines 1.2, the first step to setting the environmental context was to consider the components or features in the area where the action would take place. This informed the definition of the study area.

At its broadest extent, the action would take place in the WSI-specific aviation airspace contained within the north-western quadrant of the Sydney Basin. This is defined generally from Runway 05 / 23 to joining the enroute airways beyond WSI's terminal airspace control area, often referred to as the terminal manoeuvring area. The terminal manoeuvring area is a notionally circular configuration centred on the Airport Site. For the purposes of this EIS, the assessment considers the potential for effects notionally out to around 45 nautical miles (nm) (83 kilometres (km)) along each flight path from WSI.

The lateral and vertical geographical extent of the study area adopted for the EIS varied according to the matter assessed as specified in each EIS chapter and accompanying technical paper.

For certain matters the study area was divided into components to assess the components or features of the environment most likely to be impacted.

10.4.2 Defining the existing environment

Identification and assessment of baseline environmental values and conditions provides the foundation against which potential impacts are assessed. The approach to describing and defining the existing environment was specific to each impact assessment and was undertaken in accordance with relevant guidelines and best practice. Specific sources of baseline information included:

- maps and aerial photographs of both historical and contemporary features
- data collected from surveys and sampling on the Airport Site and in the defined study area, including background noise levels, historical records of fauna, landscape character; etc
- documentary information from a wide variety of sources, including historical and contemporary records
- previous studies and literature, database searches, consultation findings and modelling.

The existing environment is described in detail in the technical papers and summarised in Chapter 11 through to Chapter 23. Limitations in the available baseline data is identified in technical papers and the summary provided in the EIS.

10.4.3 Identifying potential impacts

In accordance with the Significant Impact Guidelines 1.2, the project was considered at its broadest scope to identify its potential direct and indirect impacts according to each assessment topic. Facilitated impacts, as a result of airspace changes required for other airspace users has also been assessed within this EIS (Chapter 21 (Facilitated impacts)).

In terms of on-site versus off-site impacts, in the context of WSI, the impacts from the project are all 'off-site' with on-airport impacts accounted for in the 2016 EIS. The term 'on site' is not relevant to the project.

An assessment of cumulative impacts was also required to identify whether the project, which would take place in an airspace that is already impacted, may nevertheless have a significant impact on the environment if cumulative impacts are increased to unacceptable levels, for example, through the release of pollutants or due to changes in noise levels in relation to on-ground sources such as road, rail and industry. The assessment of cumulative impacts is described in Chapter 22 (Cumulative impacts).

Consideration was given to all adverse and beneficial impacts that could reasonably be predicted to follow from the project, whether these impacts are within the control of the person proposing to take the action (the DITRDCA) or not.

10.4.4 Determining the assessment type

Potential impacts were assessed using a (predominantly) qualitative or quantitative approach, depending on the nature of the issue and the requirements of relevant guidelines and policies, including those referred to in the EIS Guidelines. These can be defined as follows:

- A **quantitative assessment** refers to a process of data analysis that can be counted or measured and allocated a numeric value. It relies on having a suitable data sample size and definitive data trend or outcome, and in the context of an airspace change proposal, a measurable output that can be clearly used to assess the level of change against standard criteria.
- A **qualitative assessment** is subjectively focused, and data is typically unstructured or semi-structured. Such data has potentially more variation or smaller data sample sizes, and in the context of facilitated change may rely on the application of precedence and generic supporting tools.

The impacts have been assessed assuming that a number of design features are incorporated into the project to minimise the potential for impacts. These features form part of the baseline project for which approval is sought.

10.4.4.1 Significance assessment

To assess significance or compliance for each assessment topic, the following steps were followed:

- define the criteria to evaluate the significance of any impact or performance against relevant guideline criteria (for example, published limits or thresholds)
- define the potential impacts of the project using the project description (see Chapter 7 (The project)), which incorporates the standard mitigation (that is, statutory compliance and measures incorporated in the design)
- assess the significance (or compliance) using a framework appropriate for each assessment topic
- where a significant impact is identified, which may be associated with a non-compliance against standard guideline values, consider additional mitigation measures to reduce the severity and/or likelihood of the impact, where feasible and safe to do so.

In the case of aircraft noise, a suite of metrics that describe aircraft noise, designed to be meaningful and understandable to both residents and decision-makers, allowing all stakeholders (airlines, airports, communities, regulators, consultants) to understand the likely resulting noise environment. As outlined in Chapter 11 (Aircraft noise), while there are no legislative criteria for the evaluation of aircraft noise in Australia, accepted industry practice is to consider changes within ANEC, N70 24-hours, N60 night and N60 24-hours.

10.4.5 Unknown and unpredictable impacts

Potential environmental impacts of the proposed action have been appropriately identified at this stage of the design development (Phase 2 – Preliminary design). Impacts relating to the majority of issues are well understood and any uncertainties are documented where relevant in individual impact assessments within Chapters 11 to Chapter 23 of the EIS. The application of comprehensive mitigation and management measures and continuous improvement through review of the performance of environmental controls would be implemented (see Chapter 24 (Mitigation and management)). Cumulative impacts associated with the project and the range of screened projects outlined in Chapter 22 (Cumulative impacts) are likely to be partially unpredictable due to the complexity and uncertainty of the exact timing associated with these developments. However, mitigation measures outlined in Chapter 24 have been developed to manage the cumulative impacts of project interfaces and mitigate uncertainty over these impacts.

10.4.6 Mitigation, management and residual impacts

Mitigation and management measures were identified to minimise or avoid those impacts identified where significant impacts were identified, where it is safe and feasible to do so. The consideration of residual impacts following implementation of available mitigation is provided in each of the subject matter chapters in the EIS and in Chapter 25 (Conclusion).

10.5 Assessment years and scenarios

The assessment of potentially significant impacts requires a comparison to be made between the likely environmental conditions that will result under the project (that is, due to the introduction of new flight paths, airspace management concepts and procedures to facilitate aircraft arriving and departing WSI's single runway system) relative to existing conditions.

10.5.1 Assessment years

For this EIS, particular years have been selected as points in time for assessing any future significant environmental impacts in the short- and long-term. These years are all tied to Stage 1, and the reasons for their selection are given below:

1. **2033** – representing the early years of airport operation, when single runway operations handle up to 10 million annual passengers and around 81,000 air traffic movements per year.
2. **2040** – representing an interim year of operation, when single runway operations handle around 15 million annual passengers and around 107,000 air traffic movements per year. This assessment year is assessed only for the assessment of aircraft noise to provide further information on the change in aircraft noise over time.
3. **2055** – representing impacts as the single runway approaches capacity, when single runway operations handle around 37 million annual passengers and around 226,000 air traffic movements per year.

Based on forecast schedules, these assessment years, and their approximate service capacity in terms of millions of annual passengers (MAPs) and air traffic movements (ATMs) per year (including freight operations) are depicted in Figure 10.1.

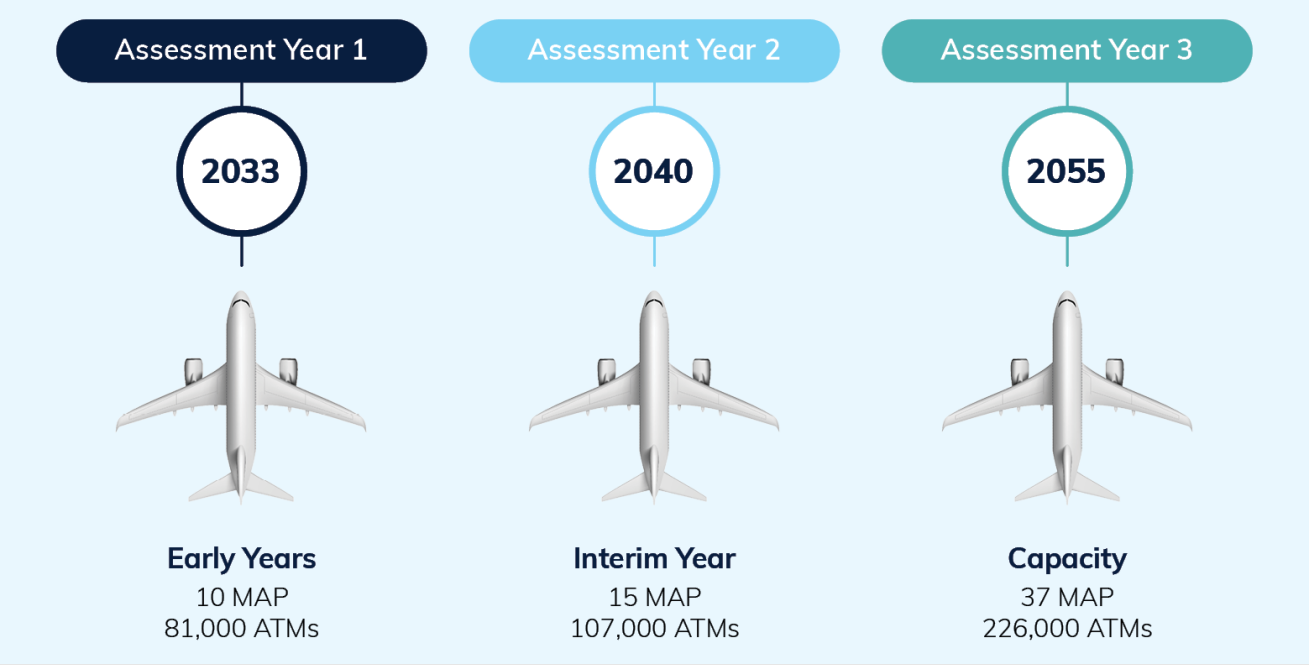

Figure 10.1 WSI assessment years

10.5.2 Assessment scenarios

The 3 runway modes of operation are presented in Chapter 7 (The project) - runway modes 05, 23 and reciprocal runway operations (RRO). Chapter 7 (The project) also includes the criteria that need to be met for the application of RRO. Runway availability and then runway usage would depend on a number of factors, including the selection criteria for each runway mode of operation, the meteorological conditions and the time of day. The selected operating scenarios used in noise modelling were:

- 'No preference', meaning that runway use was determined based on prevailing wind direction, resulting in balanced usage (approximately 50 per cent on both Runway 05 and Runway 23) in terms of runway direction and runway end exposure. This indicated that both runway ends are exposed to a similar proportion of arrivals and departures on an annualised basis
- 'Prefer Runway 05', meaning that the use of Runway 05 (day) and RRO (night) is preferred
- **'**Prefer Runway 23', meaning that the use of Runway 23 (day) and RRO (night) is preferred.

For this EIS, the implications of noise exposure due to the inability to apply RRO is modelled using No preference.

The terms 'prefer' or 'preference' was given to where, if wind conditions, and traffic demand allows, a particular runway mode of operation (mode) would be used to move aircraft as efficiently as possible while reducing the noise impact over certain residential areas. Further details on operating scenarios used for modelling is provided in Chapter 11 (Aircraft noise).

For assessments that use the results of the aircraft noise assessment, the composite noise contours for 2033 and 2055 have been used (meaning the composite of the noise results from each operating scenario for each assessment year). This provides the expected 'worst case' noise exposure of communities.

10.5.3 Facilitated changes

There are required airspace changes prior to the opening of WSI as described in Chapter 8 (Facilitated changes). The assessment of these changes has applied the traffic forecast growth for Sydney (Kingsford Smith) Airport, Bankstown Airport and Camden Airports as presented in Chapter 4 (Project setting), and typically represent the year 2030.