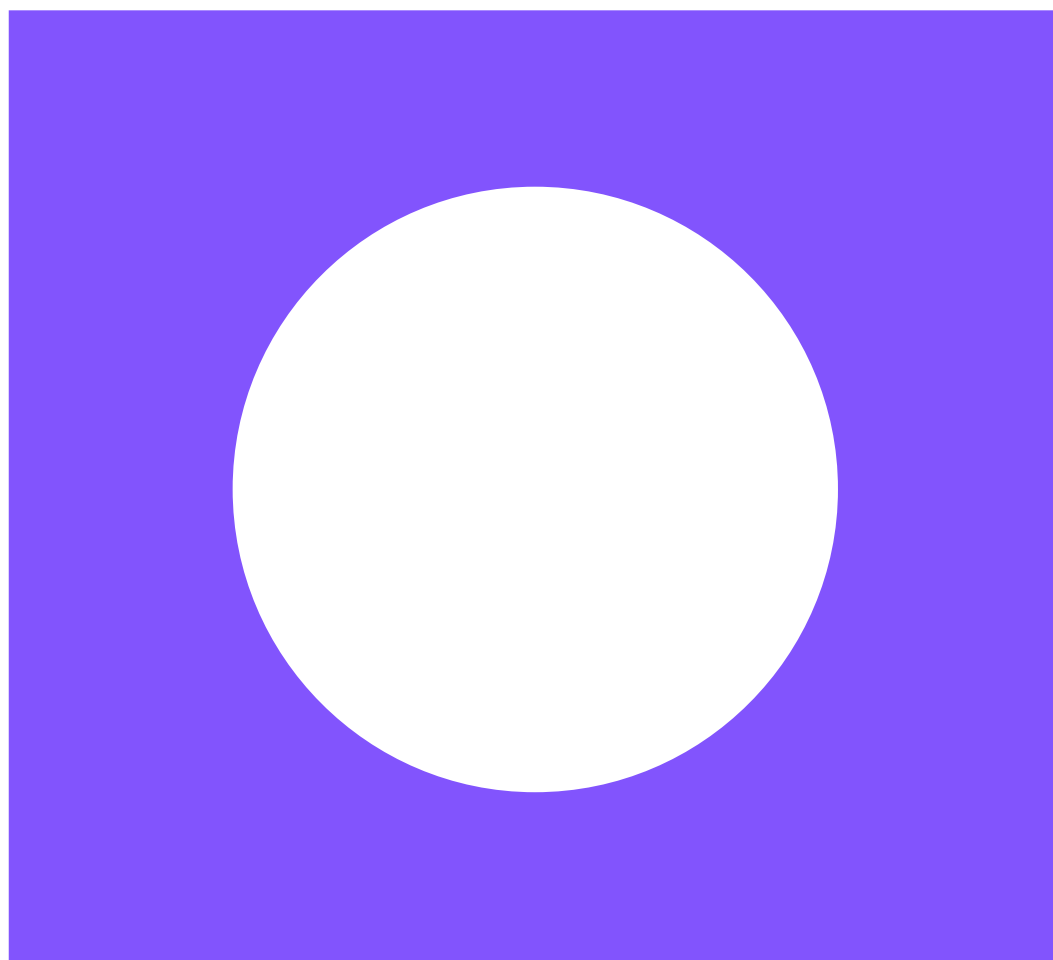




# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapters 1 to 4

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapters 1 to 4**

September 2025

# Issue and Revision Record

| Revision | Date       | Originator | Checker | Approver | Description                                |
|----------|------------|------------|---------|----------|--------------------------------------------|
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| B        | 28/08/2025 | SM / BH    | KD      | BM       | Updated report following external comments |
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|          |            |            |         |          |                                            |
|          |            |            |         |          |                                            |
|          |            |            |         |          |                                            |
|          |            |            |         |          |                                            |
|          |            |            |         |          |                                            |

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# Contents

|                                                    |           |
|----------------------------------------------------|-----------|
| Acronyms and abbreviations                         | 1         |
| <b>1 Introduction</b>                              | <b>3</b>  |
| 1.1 Background                                     | 3         |
| 1.2 Project parties                                | 4         |
| 1.3 Purpose of ESIA                                | 4         |
| 1.4 ESIA report structure                          | 5         |
| 1.5 Contact details                                | 6         |
| <b>2 Project description</b>                       | <b>7</b>  |
| 2.1 Overview                                       | 7         |
| 2.2 Need for the Project                           | 7         |
| 2.3 History, timeline and future project           | 8         |
| 2.4 Project location                               | 9         |
| 2.5 Project components                             | 10        |
| 2.6 Associated facilities                          | 15        |
| 2.7 Embedded mitigation                            | 15        |
| 2.8 Construction activities                        | 18        |
| Construction timeline                              | 18        |
| Construction methods                               | 18        |
| Construction hours                                 | 18        |
| Construction materials                             | 18        |
| Construction plant                                 | 19        |
| Construction vehicles and routes                   | 20        |
| Construction compounds                             | 20        |
| Staff and welfare                                  | 21        |
| 2.9 Operational activities                         | 21        |
| Airside operations                                 | 21        |
| Refuelling operations                              | 22        |
| De-icing operations                                | 22        |
| Terminal and passenger services                    | 22        |
| Support facilities and staffing                    | 22        |
| Environmental, health and safety management        | 23        |
| 2.10 Decommissioning activities                    | 23        |
| <b>3 Policy, legal and institutional framework</b> | <b>24</b> |
| 3.1 Overview                                       | 24        |
| 3.2 International standards and guidelines         | 24        |
| Lenders environmental and social standards         | 24        |

|          |                                                     |           |
|----------|-----------------------------------------------------|-----------|
| 3.3      | Regional and international standards and guidelines | 26        |
| 3.4      | National requirements                               | 27        |
| <b>4</b> | <b>ESIA scope and methodology</b>                   | <b>29</b> |
| 4.1      | Overview                                            | 29        |
| 4.2      | ESIA screening                                      | 29        |
| 4.3      | ESIA scoping                                        | 29        |
|          | Technical scope                                     | 29        |
|          | Assessment scope                                    | 30        |
| 4.4      | Impact assessment process                           | 30        |
| 4.5      | ESIA study area                                     | 31        |
|          | Project Affected Area                               | 31        |
|          | Area of Influence                                   | 31        |
| 4.6      | Baseline conditions consideration                   | 31        |
| 4.7      | Assessment methodology                              | 31        |
|          | Magnitude criteria                                  | 32        |
|          | Sensitivity criteria                                | 32        |
|          | Attribution of significance of impacts              | 33        |
|          | Cumulative assessment                               | 33        |
| 4.8      | Mitigation and enhancement measures                 | 34        |
| 4.9      | Residual effects                                    | 34        |
| 4.10     | Uncertainty                                         | 34        |

## Tables

|                                                                                                              |    |
|--------------------------------------------------------------------------------------------------------------|----|
| Table 1.1: Summary of key Project parties                                                                    | 4  |
| Table 1.2: ESIA report structure                                                                             | 5  |
| Table 1.3: Standalone documents supporting the Project ESIA                                                  | 6  |
| Table 1.4: Contact details                                                                                   | 6  |
| Table 2.1: Air traffic forecast outputs (passenger numbers and ATMs) for the years 2025, 2030, 2040 and 2050 | 8  |
| Table 2.2: Project components summary description                                                            | 12 |
| Table 2.3: Existing and planned embedded mitigation                                                          | 15 |
| Table 2.4: Proposed construction programme                                                                   | 18 |
| Table 2.5: Construction materials                                                                            | 19 |
| Table 2.6: YDA anticipated equipment                                                                         | 19 |
| Table 3.1: Comparative overview of IFC PSs and EBRD ESRs, including scope and triggers for application       | 25 |
| Table 3.2: Relevant international legislation                                                                | 26 |
| Table 3.3: Relevant regulations and standards                                                                | 27 |
| Table 4.1: Agreed scope of the ESIA                                                                          | 29 |
| Table 4.2: Criteria for determining impact magnitude                                                         | 32 |
| Table 4.3: Criteria for determining the sensitivity of a receptor                                            | 33 |

|                                            |    |
|--------------------------------------------|----|
| Table 4.4: Significance attribution matrix | 33 |
|--------------------------------------------|----|

Figures

|                                                    |    |
|----------------------------------------------------|----|
| Figure 2.1: Location plan                          | 7  |
| Figure 2.2: Existing infrastructure at the airport | 10 |
| Figure 2.3: Project components                     | 11 |

# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                                                                                                      |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| ALA                    | Almaty International Airport                                                                                                    |
| AoI                    | Area of Influence                                                                                                               |
| ATM                    | Air Traffic Movements                                                                                                           |
| BHS                    | Baggage Handling System                                                                                                         |
| CAPEX                  | Capital Expenditure                                                                                                             |
| CAT                    | Convention against Torture                                                                                                      |
| CAT-OP                 | Optional Protocol of the Convention against Torture                                                                             |
| CCRP                   | Covenant on Civil and Political Rights                                                                                          |
| CED                    | Convention for the Protection of All Persons from Enforced Disappearance                                                        |
| CEDAW                  | Convention on the Elimination of All Forms of Discrimination against Women                                                      |
| CERD                   | Convention on the Elimination of All Forms of Racial Discrimination                                                             |
| CESCR                  | Covenant on Economic, Social and Cultural Rights                                                                                |
| CRC-OP-AC              | Optional Protocol to the Convention on the Rights of the Child on the Sale of children child prostitution and child pornography |
| CUP                    | Central Utility Plant                                                                                                           |
| DEG                    | Deutsche Investitions – und Entwicklungsgesellschaft                                                                            |
| EBRD                   | European Bank for Reconstruction and Development                                                                                |
| EDB                    | Eurasian Development Bank                                                                                                       |
| EDGE                   | Excellence in Design for Greater Efficiencies                                                                                   |
| EHS                    | Environmental, Health and Safety                                                                                                |
| EIA                    | Environmental Impact Assessment                                                                                                 |
| EPC                    | Engineering, Procurement, and Construction                                                                                      |
| ESAP                   | Environmental and Social Action Plan                                                                                            |
| ESG                    | Environment, Social and Governance                                                                                              |
| ESIA                   | Environmental and Social Impact Assessment                                                                                      |
| ESMP                   | Environmental and Social Management Plan                                                                                        |
| ESMS                   | Environmental and Social Management System                                                                                      |
| HVAC                   | Heating, Ventilation, and air Conditioning                                                                                      |
| ICAO                   | International Civil Aviation Organization                                                                                       |
| IFC                    | International Finance Corporation                                                                                               |
| IFSA                   | International Flight Services Association                                                                                       |
| ILO                    | International Labour Organisation                                                                                               |
| ILS                    | Instrument Landing System                                                                                                       |
| JIG                    | Joint Inspection Group                                                                                                          |
| LAR                    | Land Acquisition and Resettlement                                                                                               |
| NGO                    | Non-governmental Organisation                                                                                                   |
| NIP                    | Noise Insulation Programme                                                                                                      |
| NTS                    | Non-technical Summary                                                                                                           |
| PAA                    | Project Affected Area                                                                                                           |
| PR                     | Performance Requirements                                                                                                        |

| Abbreviation / Acronym | Definition                  |
|------------------------|-----------------------------|
| PS                     | Performance Standards       |
| PSZ                    | Public Safety Zone          |
| SEP                    | Stakeholder Engagement Plan |
| SPZ                    | Sanitary Protection Zone    |

# 1 Introduction

## 1.1 Background

- 1.1.1 Mott MacDonald Ltd, supported by EcoSocio Analysts LLC, has been appointed by Almaty International Airport (also referred to by its airport code, ALA), located in Almaty, Kazakhstan, to deliver the Environmental and Social Impact Assessment (ESIA) for Project Horizon (hereafter referred to as "the Project"), which includes upgrades to existing airport facilities and the construction of new facilities predominantly within land owned by the airport. This report presents the findings of that ESIA. This chapter provides an introduction to the ESIA and the organisations involved, as well as an outline of the structure of the ESIA documentation.
- 1.1.2 Almaty International Airport is located approximately 12km to the north-east of central Almaty; further details on the Project location are provided in Section 2.4. ALA is the busiest international airport in Kazakhstan in terms of both passenger numbers and aircraft movements. The airport currently consists of two runways and associated taxiways, the domestic terminal building (T1), the international terminal building (T2), a VIP building, a fuel farm, hangars and workshops, and auxiliary facilities.
- 1.1.3 The International Finance Corporation (IFC), the European Bank for Reconstruction and Development (EBRD), Deutsche Investitions - und Entwicklungsgesellschaft (DEG), and the Eurasian Development Bank (EDB) (collectively referred to as "the Lenders") are considering providing financing for the Project. Accordingly, all deliverables will be prepared in alignment with the sustainability performance standards and requirements set forth by the Lenders. ALA is looking to secure funding for its capital expenditure (CAPEX) for the period 2025-2029. The main elements of expenditure involve the following developments:
- Full depth reconstruction of main runway
  - New taxiway
  - New cargo apron
  - Full depth reconstruction of existing VIP apron
  - New de-icing pad
  - Rehabilitation of parking stands
  - New in-flight catering facility
  - Fuel farm storage expansion and improvements to existing fuel farm
  - Domestic terminal (T1) renovation
  - Drainage and wastewater treatment
  - New head office and training centre
  - Aerodrome and ground handling village
  - New landside and airside warehouses
  - Other improvements
- 1.1.4 Further detail on the Project components is provided in Chapter 2.
- 1.1.5 ALA recently completed the construction of a new international terminal (T2), which officially opened in June 2024. A previous ESIA<sup>1</sup> undertaken in 2022 (referred to as the '2022 ESIA') assessed this development which included the new international terminal, upgrading of the existing terminal to convert it into a domestic terminal and associated infrastructure such as

---

<sup>1</sup> Mott MacDonald (2022). Almaty Airport Expansion ESIA

highways alterations. The Lenders provided finance for the previous works at ALA and additional financing is being sought for this Project. There is potential that relevant ongoing Environmental and Social (E&S) commitments associated with the previous development may overlap with those required as a result of this ESIA which is assessing Project Horizon only.

## 1.2 Project parties

1.2.1 Several organisations and entities are involved in the planning and development of the Project, each with specific roles and responsibilities. Table 1.1 summarises the key roles in the Project development.

**Table 1.1: Summary of key Project parties**

| Organisation / party             | Role                                                         | Role details                                                                                                                                                                                                                          |
|----------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TAV                              | Project Sponsor                                              | TAV is an airport operations organisation based in Turkey, with the French group Groupe ADP being the largest shareholder (46%). TAV owns 85% of ALA. TAV has been supported by consultants working on the airport masterplan (NACO). |
| IFC                              | Prospective Project Lender                                   | Provides funding for the Project                                                                                                                                                                                                      |
| EBRD                             | Prospective Project Lender                                   | Provides funding for the Project                                                                                                                                                                                                      |
| DEG                              | Prospective Project Lender                                   | Provides funding for the Project                                                                                                                                                                                                      |
| EDB                              | Prospective Project Lender                                   | Provides funding for the Project                                                                                                                                                                                                      |
| SE Solutions                     | Lender's E&S Advisor                                         | Assessed compliance towards the Lenders' E&S requirements with regards to the previous development at ALA (construction of the new international terminal).                                                                           |
| WSP                              | Lender's Technical Advisor                                   | Advises the Lenders on risks, feasibility, and alignment of the Project with international standards.                                                                                                                                 |
| Mott MacDonald                   | ESIA Consultant                                              | Prepares the ESIA for the Project and other associated documentation.                                                                                                                                                                 |
| EcoSocio Analysts                | Local Sub-consultant                                         | Appointed by the ESIA Consultant to carry out the socio-economic surveys in-country.                                                                                                                                                  |
| Frekans                          | Noise Consultant                                             | Prepares the noise modelling and reporting and operates noise monitoring stations with quarterly noise reports.                                                                                                                       |
| YDA and others not yet appointed | Engineering, procurement, and construction (EPC) Contractors | YDA has been appointed as the EPC contractor for the Project components 1 to 6 in Table 2.2. EPC Contractors have not been yet appointed for the other Project components.                                                            |

## 1.3 Purpose of ESIA

1.3.1 ESIA is a process to identify, predict, and evaluate the potential environmental and social effects of a proposed project. It enables the development of mitigation measures and helps determine the level and nature of potential effects. An understanding of the environmental and social baseline is required, and this is assessed against the project design, construction works proposed and operation conditions. Using professional judgement and the methodology presented in Chapter 4, a conclusion can therefore be made regarding the level of likely impacts and effects that the project will have on the existing environmental and social baseline.

1.3.2 An ESIA is required for this Project due to its potential to generate adverse environmental and social impacts, and to ensure alignment with the Lenders' environmental and social standards.

## 1.4 ESIA report structure

1.4.1 This document forms the main ESIA report (Volume II). It presents the assessment findings in a structured format. Table 1.2 outlines the structure of the ESIA report.

**Table 1.2: ESIA report structure**

| Volume                                     | Chapter                                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Volume I – Non-technical summary (NTS)     | -                                                | Provides a high-level overview for readers outlining the scope and nature of the Project. Includes a short but comprehensive summary of this ESIA report, with an emphasis on expected impacts and management measures. Used as a tool to aid consultation and information disclosure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Volume II – Main ESIA report (this report) | <b>1 Introduction (this chapter)</b>             | Presents a brief overview of the project, description of key stakeholders, and outline of contents of the report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                            | 2 Project description                            | Explains the relevant details of the Project, including its location, main elements, and activities for construction and operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                            | 3 Policy, legal and institutional framework      | Defines key national policy, legislation and international Lender guidelines applicable to the Project, as well as key national institutions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                            | 4 ESIA scope and methodology                     | Sets out the stages of the ESIA, key assumptions and methodologies for undertaking the ESIA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                            | 5 Air quality                                    | Presentation of technical assessments undertaken. These include a summary of baseline conditions developed from quantitative and qualitative primary and secondary data sources and fieldwork and also environmental impacts and suggested mitigation measures. Direct and indirect impacts, temporary and permanent impacts of reversible or irreversible natures are identified, along with mitigation measures to be implemented in order to reduce a conclusion on the level of the resulting effects on the environment, both positive and negative. The significance of the residual (post-mitigation) effects is presented. Cumulative impacts are addressed in this ESIA, including those arising from different components of the Project and, where relevant, in combination with other developments. |
|                                            | 6 Biodiversity                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 7 Climate resilience                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 8 Community                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 9 Geology and soils                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 10 Greenhouse gases                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 11 Noise                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 12 Traffic and transport                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 13 Waste and resources                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 14 Water resources                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 15 Workers                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 16 Cumulative assessment                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                            | 17 Environmental and social management framework | Outlines the overarching framework through which the project will manage environmental and social risks and impacts throughout its lifecycle. It serves as a bridge between the impact assessment and the implementation of mitigation and monitoring measures, and builds on the Project's existing ESMS and organisational capacity to manage environmental and social performance                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                            | 18 Information disclosure and consultation       | This chapter outlines the information disclosure, consultation and participation activities that have been undertaken as part of the ESIA process in accordance with the Stakeholder Engagement Plan (SEP).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                            | 19 Conclusion                                    | The overall conclusions of the ESIA are presented.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

1.4.2 In addition to this ESIA report, a number of related standalone documents have been prepared to support the assessment. These are listed in Table 1.3.



**Table 1.3: Standalone documents supporting the Project ESIA**

| Related standalone documents                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stakeholder Engagement Plan (SEP)               | Guides stakeholder engagement (information disclosure and meaningful consultation) on the Project in line with national and international standards. Includes a grievance mechanism for stakeholders to use.                                                                                                                                                                                                                      |
| Environmental and Social Management Plan (ESMP) | The ESMP and its associated sub-plans (including Noise Management Plan) are live documents and will require regular review by ALA, as set out within them; hence they are subject to future modification if required. Further detailed management plans will be developed for the construction and operational phases by the respective contractor (led by the EPCs) in accordance with the policies, guidelines and legislation. |
| Compliance Assessment Report                    | Assesses the Project's alignment with the Lender's sustainability standards and clearly references where each requirement is addressed within the ESIA document.                                                                                                                                                                                                                                                                  |
| Environmental and Social Action Plan (ESAP)     | Defines the corrective and enhancement measures required to align the Project with the Lender's environmental and social standards (i.e. IFC Performance Standards (PSs), EBRD Environment and Social Requirements (ESRs)), including timelines, responsibilities, and monitoring requirements.                                                                                                                                   |

## 1.5 Contact details

1.5.1 Contact details for enquiries on this ESIA are detailed in Table 1.4.

**Table 1.4: Contact details**

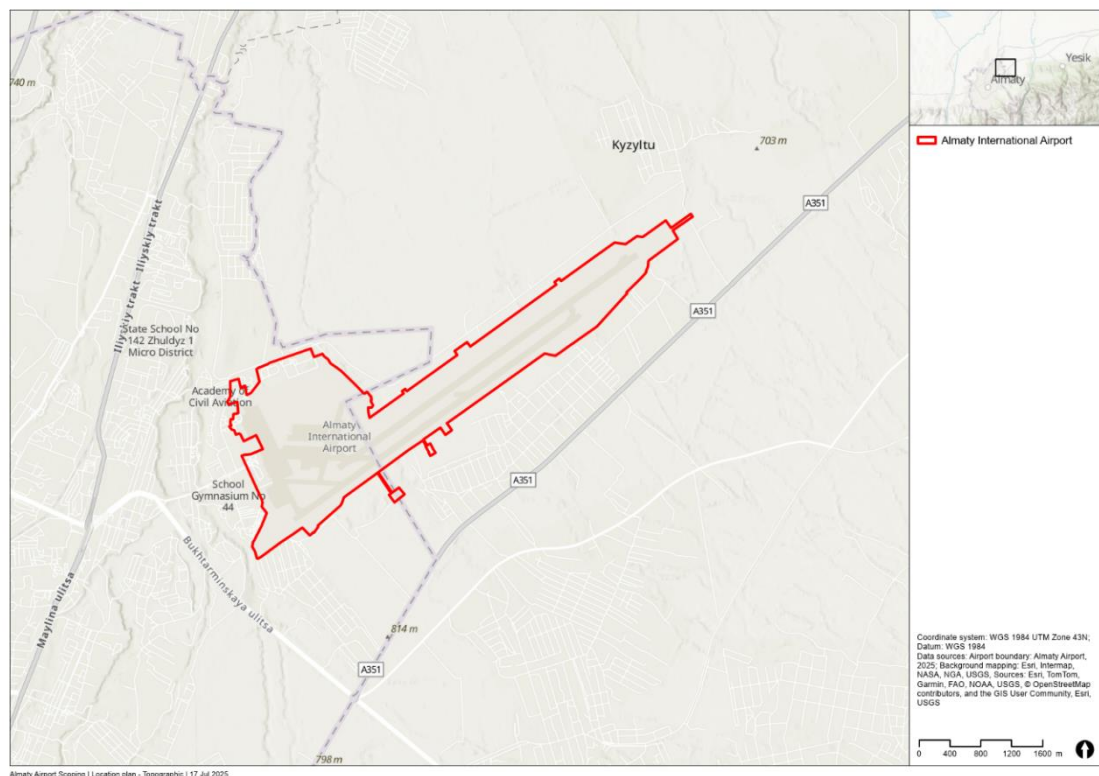
| Project Sponsor                   | Information                                                                                           |
|-----------------------------------|-------------------------------------------------------------------------------------------------------|
| Name of company                   | TAV Airports Holding                                                                                  |
| Address                           | Vadistanbul Bulvar, Ayazaga Mahallesi Cendere Caddesi No: 109L 2C Blok 34485 Sariyer/Istanbul, Turkey |
| Telephone                         | +90 212 463 30 00                                                                                     |
| Email                             | <a href="mailto:info@tav.aero">info@tav.aero</a>                                                      |
| Website                           | <a href="http://www.tavhavalimanlari.com.tr/">http://www.tavhavalimanlari.com.tr/</a>                 |
| Project Community Liaison Officer | Information                                                                                           |
| Name                              | Mariya Pozdnyakova                                                                                    |
| Address                           | 1b Akhmetov Str., 2 Floor, Office 245                                                                 |
| Telephone                         | +7 708 115 05 14                                                                                      |
| Email                             | <a href="mailto:Mariya.Pozdnyakova@tav.aero">Mariya.Pozdnyakova@tav.aero</a>                          |
| Website                           | <a href="https://alairport.com/en-EN/">https://alairport.com/en-EN/</a>                               |

## 2 Project description

### 2.1 Overview

- 2.1.1 As described in Section 1.1, ALA is proposing several airport developments at Almaty International Airport. These developments comprise “the Project” and represent a sub-set of the broader Master Plan referenced in Section 2.3. While detailed design development for these developments is still underway, the current level of information is deemed sufficient to identify the key environmental and social aspects, support the impact assessment, and inform the development of appropriate mitigation measures for the construction and operational phases.
- 2.1.2 Figure 2.1 shows the location of the airport. The Project is located within the existing operational airport boundary, with limited exceptions, including the new head office and training centre and a small parcel as part of the new taxiway (see Table 2.2 for a summary of the Project components). The land for the new head office and training centre has been recently acquired by ALA. The small parcel that forms part of the new taxiway has not yet been acquired by ALA, however this plot of land will not be developed immediately, and is reserved in the local municipality plan for aircraft stand purposes in line with ALA’s future needs. No additional land acquisition is proposed.

**Figure 2.1: Location plan**



### 2.2 Need for the Project

- 2.2.1 As the largest international airport in Kazakhstan, ALA currently serves more than 35 airlines, including hub operations for national Kazakhstan carrier Air Astana. The airport’s total traffic has

experienced strong growth since 2005. Strategically positioned between Asia and Europe, ALA has also established itself as a cargo hub, facilitating efficient logistics across continents.

- 2.2.2 The need for the Project is driven by a steady and substantial increase in air traffic numbers in recent years, which have already exceeded the projections made in the 2022 ESIA. For instance, the passenger numbers forecast for 2032 (10 million passengers) have already been reached, indicating a higher rate of growth than originally anticipated. In 2024, ALA handled 11,426,650 passengers. This trend is placing growing pressure on existing infrastructure and services. Without the Project, future growth will be constrained due to limitations in key infrastructure, such as the aprons, runway, taxiway, fuel farm, and domestic terminal. The Project is therefore essential to ensure that capacity aligns with current and future demand, to maintain service quality, and support continued development in a sustainable and efficient manner.
- 2.2.3 Current aspirations from ALA are to expand the airport capacity, safety and operational efficiency in line with potential forecast increase in passenger numbers and cargo traffic. In 2025, ALA is projected to handle approximately 12.3 million passengers (5.5 million from international traffic and 6.8 million from domestic traffic) and 10,400 cargo Air Traffic Movements (ATMs).

2.3 History, timeline and future project

- 2.3.1 ALA recently completed the construction of a new international terminal (T2), which officially opened in June 2024. The 2022 ESIA assessed this development which included the new international terminal, upgrading of the existing terminal to convert it into a domestic terminal and associated infrastructure such as highways alterations. Subsequently, an ESAP was developed and progress against it monitored throughout 2022 to 2025, with findings recorded in a series of monitoring reports.
- 2.3.2 Since the official opening of the T2 in June 2024, renovation works have been initiated at the domestic terminal (T1), which is currently in poor condition despite handling approximately six million passengers annually.
- 2.3.3 A broader Master Plan has since been developed for ALA, which is designed to accommodate projected growth in demand between 2025 and 2050. The Project corresponds to Phase 1 of the five planned phases. The components covered by this assignment (see Table 2.2 for further details) are scheduled for completion by 2028 and represent the initial implementation stage of the long-term strategy. This first phase is intended to address immediate capacity needs while establishing the foundation for subsequent development. The phased approach allows for infrastructure expansion to be aligned with evolving demand forecasts and ensures flexibility in long-term planning.
- 2.3.4 An air traffic forecast was undertaken by the Traffic Advisor<sup>2</sup>. The draft outputs show that ALA will see a steady and continuous growth in passenger numbers and air traffic movements (ATMs) (see Table 2.1)

**Table 2.1: Air traffic forecast outputs (passenger numbers and ATMs) for the years 2025, 2030, 2040 and 2050**

|                       |               | 2025      | 2030      | 2040       | 2050       |
|-----------------------|---------------|-----------|-----------|------------|------------|
| Commercial passengers | Domestic      | 6,801,909 | 8,627,604 | 12,012,621 | 14,711,885 |
|                       | International | 5,536,386 | 7,421,150 | 10,285,738 | 13,154,834 |

<sup>2</sup> Mott MacDonald (2025). Project Horizon Traffic Advisor in relation to the new Investment plan of Almaty International Airport in Kazakhstan, Traffic Forecasts Outputs (Base, Low, Climate) - DRAFT (NON-RELIANCE BASIS), Version 6.0, 29 July 2025.

|                                    |               | 2025              | 2030              | 2040              | 2050              |
|------------------------------------|---------------|-------------------|-------------------|-------------------|-------------------|
|                                    | <b>Total</b>  | <b>12,338,295</b> | <b>16,048,754</b> | <b>22,298,359</b> | <b>27,866,719</b> |
| Commercial<br>ATMs                 | Domestic      | 43,478            | 55,708            | 77,121            | 93,912            |
|                                    | International | 39,637            | 54,002            | 71,902            | 88,418            |
|                                    | <b>Total</b>  | <b>83,115</b>     | <b>109,710</b>    | <b>149,023</b>    | <b>182,330</b>    |
| Cargo ATMs                         | Domestic      | 29                | 37                | 52                | 64                |
|                                    | International | 6,083             | 7,848             | 10,957            | 13,460            |
|                                    | <b>Total</b>  | <b>6,112</b>      | <b>7,885</b>      | <b>11,009</b>     | <b>13,524</b>     |
| General aviation<br>and other ATMs | Domestic      | 3,130             | 4,010             | 5,551             | 6,760             |
|                                    | International | 2,418             | 3,294             | 4,386             | 5,394             |
|                                    | <b>Total</b>  | <b>5,548</b>      | <b>7,304</b>      | <b>9,938</b>      | <b>12,154</b>     |

## 2.4 Project location

- 2.4.1 The Project is located within land owned by the airport and amongst already existing airport infrastructure.
- 2.4.2 The airport is located approximately 12km to the north-east of central Almaty, adjacent to the outskirts of the city. It is bordered by a mix of open land and built settlements. The airport is located north of the settlement of Guldala, and north-east of a number of surrounding districts, namely Tbilisskaya and Kolhozshy, which lie within the region of Almaty. The neighbourhoods of Almerék and Panfilovo are situated to the northeast of the airport. To the north of the airport, the landscape is primarily agricultural and to the northwest the land use is predominantly industrial and commercial. The Trans-Ili Alatau mountain range is located to the south of Almaty, a significant geographical feature that influences flight paths and operational planning due to its elevation and proximity.
- 2.4.3 The airport consists of two parallel runways (05L-23R and 05R-23L), apron area, and parking stands, along with various auxiliary facilities such as car parks, a wastewater treatment facility (with a capacity of 4,320m<sup>3</sup>/day), buildings, and storage areas. In addition, a fuel farm and associated railhead and above-ground pipework are located within the northern part of the airport. The location of existing infrastructure at the airport is shown in Figure 2.2.
- 2.4.4 The general topography of the land is flat, with a gradual slope towards the north. There are limited areas of soft landscaping located to the front of the terminal buildings. All other areas largely consist of hardstanding. There are no watercourses identified within the airport boundary; the Malaya Almatinka River is situated to the west of the site, approximately 50m from the operational boundary.

Figure 2.2: Existing infrastructure at the airport



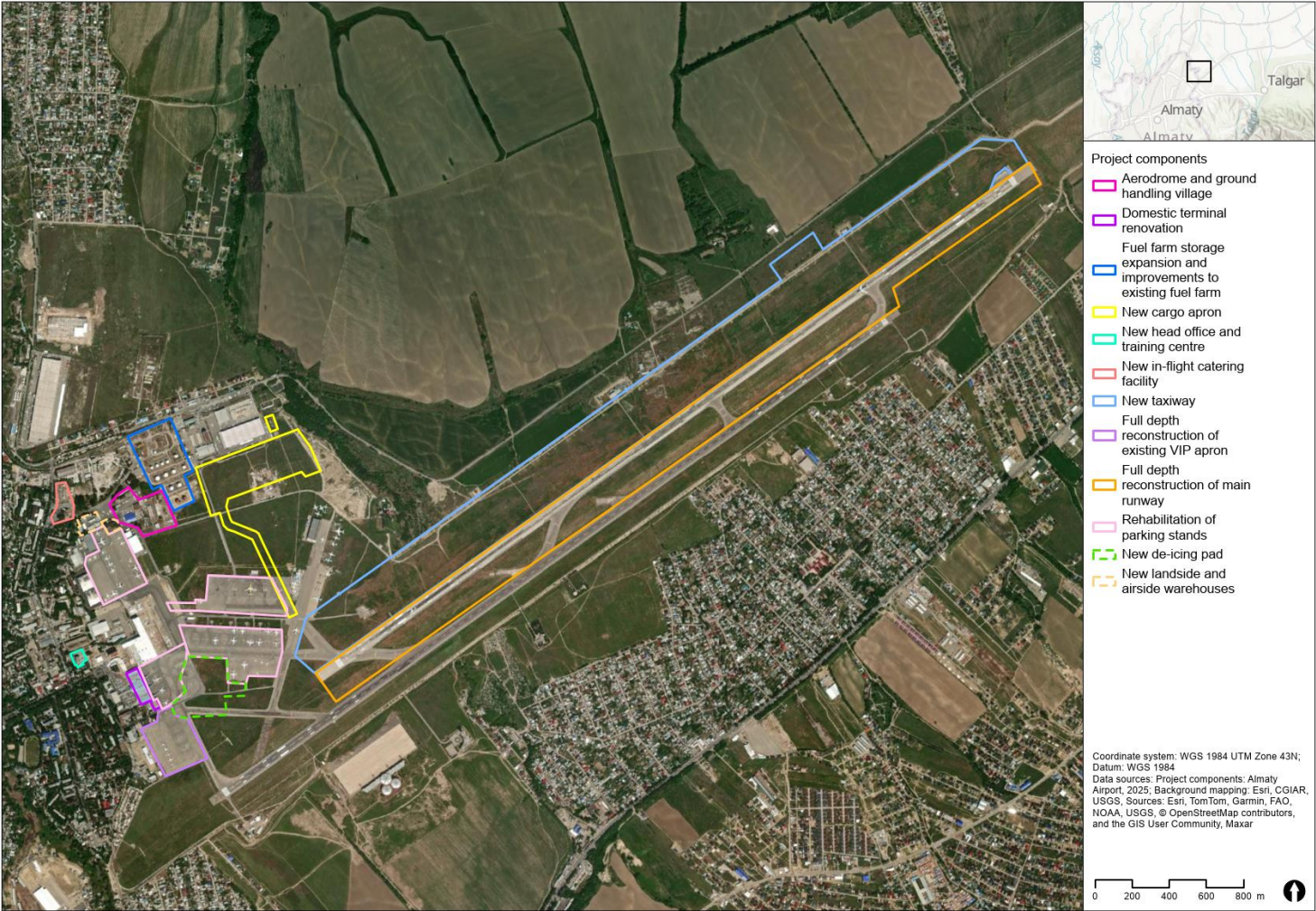
## 2.5 Project components

2.5.1 A description of each Project component is provided in Table 2.2<sup>3</sup>. The location of the Project components can be found in Figure 2.3.

<sup>3</sup> ALA, June 2025, Almaty International Airport New Investment Program (Project Horizon-Phase-1).



Figure 2.3: Project components



Almaty Airport Scoping | Project components - Imagery | 21 Aug 2025

**Table 2.2: Project components summary description**

| Nº | Project component                                                  | Indicative area (m <sup>2</sup> ) | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----|--------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Full depth reconstruction of main runway                           | 332,800m <sup>2</sup>             | The main runway of the airport (05L-23R) has deteriorated significantly over time, and it is currently used as a taxiway due to associated flight safety risks. As the base structure is compromised, complete demolition and re-construction of the runway is necessary, including associated visual aids, electrical infrastructure, and drainage infrastructure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 2  | New taxiway                                                        | 306,250m <sup>2</sup>             | Currently, the airport uses runway 05R-23L for departures and arrivals and runway 05L-23R is used as a parallel taxiway. Due to the heavy reconstruction required for runway 05L-23R, the runway must be closed during the reconstruction works and therefore a new parallel taxiway is required in advance of the runway reconstruction works. The new taxiway will also be necessary in the future for the effective operation of both runways. The new taxiway would connect existing taxiways and would include the installation of new visual aids, electrical systems, drainage, and service roads.                                                                                                                                                                                                                                                                                                                   |
| 3  | New cargo apron                                                    | 160,780m <sup>2</sup>             | To accommodate the growing cargo volume and alleviate current operational bottlenecks, a new cargo apron is proposed to be constructed adjacent to the cargo warehouse. Currently, parking stand availability nearly meets demand, leaving little margin for emergencies or demand surges which may lead to flight diversions. Additionally, the aircraft parking areas are not located in proximity to the cargo facility, resulting in operational inefficiencies. By creating additional parking stands, the new cargo apron would streamline cargo operations as well as provide additional capacity during peak periods.                                                                                                                                                                                                                                                                                               |
| 4  | Full depth reconstruction of existing VIP apron                    | 48,350m <sup>2</sup>              | The current condition of the VIP apron limits its usability due to its deformed pavement and low bearing capacity. A full reconstruction of the VIP apron is proposed to restore its structural integrity and ensure it meets the required standards for ongoing and future use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 5  | New de-icing pad                                                   | 78,250m <sup>2</sup>              | De-icing operations are currently conducted at regular stands without a designated area or appropriate wastewater collection and recycling measures. On average, de-icing is required at ALA for 120 days per year. The current de-icing operations have an impact on the pavement due to the chemicals used and may result in incidences of environmental pollution. To address these issues and provide a more operationally efficient location, a new centralised de-icing apron equipped with full support and environmental protection infrastructure is proposed to be constructed to the east of the domestic terminal building.                                                                                                                                                                                                                                                                                     |
| 6  | Rehabilitation of parking stands                                   | 102,020m <sup>2</sup>             | The airside standby areas, particularly the apron pavement, exhibit numerous deformations and defects and require maintenance regularly. To prevent future operational losses and enhance overall efficiency, the rehabilitation of the parking stands is proposed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 7  | New in-flight catering facility                                    | 5,800m <sup>2</sup>               | The existing in-flight catering facility was constructed in 1998 as a 3,000m <sup>2</sup> concrete structure and was later expanded by an additional 500m <sup>2</sup> using container structures. It currently supports a production capacity that reaches 15,000 meals per day during the high season (summer months). However, its layout and outdated design have hindered operational flow and resulted in complicated efforts to meet international standards. To address these challenges and accommodate future growth, a new 5,800m <sup>2</sup> facility is proposed to be constructed in the northwestern part of the airport boundary. This modern steel structure will be designed according to optimal operational flow while adhering to International Flight Services Association (IFSA) World Safety Guidelines and IFS Food Standards, ultimately increasing production capacity to 30,000 meals per day. |
| 8  | Fuel farm storage expansion and improvements to existing fuel farm | 6,255m <sup>2</sup>               | Fuel operations currently encompass reception, storage, accounting, quality control, fuel dispensing, and aircraft refuelling. Fuel is delivered via a dual-sided railway unloading rack that processes eight tank cars using both top and bottom loading systems powered by pumps with a capacity of 275 m <sup>3</sup> /h. After an initial 40-micron filtration, the fuel is stored in vertical tanks with a combined capacity of 41,000m <sup>3</sup> (up to 30,500 tons): <ul style="list-style-type: none"> <li>• 6 tanks of 5,000m<sup>3</sup></li> <li>• 1 tank of 3,000m<sup>3</sup></li> <li>• 4 tanks of 2,000m<sup>3</sup></li> </ul>                                                                                                                                                                                                                                                                           |

| Nº | Project component                     | Indicative area (m <sup>2</sup> )                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----|---------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                       |                                                                                | <p>The fuel is filtered before delivery through a three-stage FAUDI system (15, 5, and 1 micron). Quality control adheres to civil aviation standards, with an on-site laboratory issuing certificates for all fuels and special fluids.</p> <p>Currently, the fuel farm infrastructure is aging, with limited investment and upgrades over the years. In response to growing traffic and the construction of a new international terminal, an upgrade of the fuel infrastructure is planned to align with Joint Inspection Group (JIG) and local standards. Planned improvements include:</p> <ul style="list-style-type: none"> <li>• Installation of two new JIG-compliant 5,000m<sup>3</sup> tanks</li> <li>• Upgrade of two existing 5,000m<sup>3</sup> tanks</li> <li>• Refurbishment of five additional tanks for intermediate storage</li> <li>• Replacement of the four oldest 2,000m<sup>3</sup> tanks with two new 5,000m<sup>3</sup> tanks</li> <li>• Expansion of the railway unloading rack so that at least 12 railcars can be unloaded simultaneously (12 points)</li> <li>• Modification and expansion of the pipeline network</li> <li>• Upgrade of pump stations for fuel reception and refueller loading</li> <li>• Construction of a centralised hydrant fuelling system for the new terminal, with future extension for the cargo aircraft parking area.</li> <li>• Modernisation of power, automation, fire protection, and staff facilities</li> </ul> |
| 9  | Domestic terminal renovation          | Mainly within existing domestic terminal, minor extension of 402m <sup>2</sup> | The domestic terminal (T1) is currently in poor condition for the operation of circa 6 million passengers and its renovation was initiated soon after the opening of the new international terminal (T2). Although part of the works are already completed, there are various additional architectural works proposed to improve passenger experience (such as the re-design of arrival hall, luggage claim area, check-in hall, departure hall, security area, commercial areas), as well as full replacement of baggage handling system (BHS) sorter and the heating, ventilation, and air conditioning (HVAC) systems. The renovation will be predominantly within the existing footprint of the domestic terminal building, with a small extension for the BHS (402m <sup>2</sup> ) into the apron space.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 10 | Drainage and wastewater treatment     | To be defined during ongoing design                                            | The Project includes the design and construction of a comprehensive drainage and wastewater treatment system covering all landside areas. The system will ensure the efficient collection, conveyance, and treatment of stormwater and wastewater generated from airport facilities and operations. Key components will include stormwater drainage networks, collection basins, treatment units, and discharge structures.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 11 | New head office and training centre   | Head office within existing building. 1,000m <sup>2</sup> for training centre. | The Project includes a new head office and training centre building. The new head office is an existing building on Mailin Street that was recently acquired. It is located approximately 150m northwest of the airport entrance. A training centre will be built as an extension of the new head office. The new building will provide a modern base for airport management and technical support and the consolidation of services in one building will improve the manageability of the airport, including emergency response, security measures, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 12 | Aerodrome and ground handling village | 9,300m <sup>2</sup>                                                            | Currently, all operations are managed from 60 to 70-year-old building facilities which are in poor condition and distributed across the airport perimeter. Furthermore, offices for airside personnel are not in good condition and lack resting areas and changing rooms. Parking areas are also limited and not in accordance with suitable standards. The lack of a ground handling and aerodrome operation area is increasing the risk of accidents and inefficiencies during airside operations. Equipment is currently spread out in several places across the apron, which increases flight safety risk and makes it difficult to track the location of equipment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |



| Nº | Project component                   | Indicative area (m²) | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----|-------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                     |                      | <p>The Project includes the design and construction of a ground handling and aerodrome operation area. This would be located in the area west of the fuel farm and would include the following:</p> <ul style="list-style-type: none"> <li>• Carwash (approximately 400 m²)</li> <li>• Battery charging station (approximately 150 m²)</li> <li>• Administrative and utility building (approximately 3000 m²)</li> <li>• Hangar for ground handling equipment (approximately 3450 m²)</li> <li>• Workshop (approximately 1580 m²)</li> <li>• Canopy for ground handling equipment (approximately 720 m²)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 13 | New landside and airside warehouses | 2,700m²              | <p>Currently, the warehouses used for general maintenance and airport operations are scattered across various locations and in poor condition, lacking adequate space, efficiency and functionality. To address this, new centralised warehouse facilities will be constructed separately on the landside and airside. This will be located in the northwestern part of the airport. These buildings will be dedicated solely to internal airport operations and will not include cargo or commercial functions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 14 | Other improvements                  | N/A                  | <p>Other improvements are also planned to be undertaken as part of the Project and include:</p> <ul style="list-style-type: none"> <li>• Centralising the systems for heating, power and water into the T2 Central Utility Plant (CUP) building. Currently there are two CUP buildings, one for T1 and one for T2. The T1 CUP will be retired and instead the T2 CUP will be upgraded to accommodate both terminals.</li> <li>• Repair works including airside pavement works at the cargo terminal and cargo service road, runway, aprons, taxiway, stand positions, maintenance areas, and landside pavement works at the T1 parking, T1 viaduct, staff parking, etc.</li> <li>• Enhancements in the security system, including renewal of existing cameras, replacement of outdated X-ray equipment, communication and positioning system, alcohol/drug examination tester, etc.</li> <li>• Improvements to passenger experience including refurbishment of pedestrian bridges, renewal of the Flight Information Display System, additional e-border units, toilet renovations, sitting areas improvements, new signage, T2 ceiling renovation</li> <li>• Utility diversions as necessary for the construction of the other Project components</li> </ul> |

## 2.6 Associated facilities

- 2.6.1 This ESIA confirms that no associated facilities, as defined by IFC<sup>4</sup> and EBRD<sup>5</sup>, are planned in connection with the Project. The airport is currently operational, and the development of the Project components – intended to support projected traffic growth between 2025 and 2030 – does not require the construction or operation of any additional facilities that would be considered associated under IFC PSs.

## 2.7 Embedded mitigation

- 2.7.1 Embedded mitigation refers to environmental and social measures that are integrated into the design, planning, and operation of a project from the outset. These measures are proactively incorporated to avoid or minimise potential adverse impacts, rather than being added later as corrective actions. Examples include sustainable drainage systems, noise-reducing infrastructure, energy-efficient technologies, and biodiversity-friendly landscaping, all of which are considered part of a project's baseline design. These embedded controls are aligned with the World Bank Group's Environmental, Health and Safety (EHS) Guidelines for Airports and, where applicable, the EHS Guidelines for Fuel Storage Facilities, which outline performance levels and measures considered achievable through existing technology and good practice.
- 2.7.2 Table 2.3 outlines ALA's existing and planned embedded mitigation measures across key environmental aspects.

**Table 2.3: Existing and planned embedded mitigation**

| Key topic                   | Embedded mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | World Bank Group EHS Guidelines                                                                                                                                                                                                    |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air quality management      | <b>Existing:</b> <ul style="list-style-type: none"> <li>● Air quality monitoring on a quarterly basis</li> <li>● Following maximum permissible emissions (vehicle emissions management)</li> <li>● Dust suppression during construction</li> <li>● Industrial environmental control by specialized 3<sup>rd</sup> Party</li> </ul> <b>Planned:</b> <ul style="list-style-type: none"> <li>● Dust control</li> <li>● Vehicle emissions management</li> <li>● Use of low-emission equipment</li> </ul> | <b>Airports:</b> Section 1.1 – Emissions from aircraft, GSE, and APUs.<br><b>General:</b> Section 1.1 – Air emissions and ambient air quality.<br><b>Fuel Storage:</b> Section 1.1 – VOC emissions from fuel handling and storage. |
| Noise and vibration control | <b>Existing:</b> <ul style="list-style-type: none"> <li>● Noise barriers</li> <li>● Ambient noise monitoring</li> <li>● Noise Insulation Programme for local residents</li> </ul> <b>Planned:</b> <ul style="list-style-type: none"> <li>● Additional noise barriers (where applicable according to the noise impact assessment)</li> <li>● Expansion of noise insulation scope</li> <li>● Implementing aircraft noise abatement procedure</li> </ul>                                                | <b>Airports:</b> Section 1.2 – Noise abatement procedures and land use planning.<br><b>General:</b> Section 1.7 – Noise management.                                                                                                |

<sup>4</sup> According to IFC Performance Standards on Environmental and Social Sustainability (2012), *associated facilities* are those that are not funded as part of the project but are essential for the project to function and would not have been constructed or expanded if the project did not exist.

<sup>5</sup> According to EBRD Environmental and Social Policy (2024), *associated facilities* are those that that are not financed by the EBRD as part of the project but which, in the view of the EBRD, are significant in determining the success of the project or in producing agreed project outcomes. These are new facilities or activities: (i) without which the project would not be viable, and (ii) which would not be planned, constructed, expanded or carried out if the project did not exist.

| Key topic          | Embedded mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | World Bank Group EHS Guidelines                                                                                                                                                                                                 |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water management   | <p><b>Existing:</b></p> <ul style="list-style-type: none"> <li>● Excellence in Design for Greater Efficiencies<sup>6</sup> (EDGE) certificate for the T2 building</li> <li>● Water quality monitoring inside and outside of the airport grounds</li> </ul> <p><b>Planned:</b></p> <ul style="list-style-type: none"> <li>● Upgraded drainage facilities and water treatment plant</li> <li>● Upgrade of the CUP</li> <li>● Constructing a new future-proof drainage network for the new parallel taxiway and new apron areas.</li> <li>● Full depth reconstruction of the runway will include improved drainage to improve resilience.</li> <li>● Renovation of water and heating pipelines will reduce water consumption by eliminating leakages</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p><b>Airports:</b> Section 1.3 – Stormwater and de-icing runoff management.</p> <p><b>General:</b> Section 1.3 – Wastewater and water quality.</p> <p><b>Fuel Storage:</b> Section 1.3 – Stormwater and spill containment.</p> |
| Waste management   | <p><b>Existing:</b></p> <ul style="list-style-type: none"> <li>● Working with licensed third-party waste companies</li> <li>● Annual waste inventories report issuance</li> <li>● Certain waste types are reused and recycled</li> <li>● Segregation of hazardous waste</li> </ul> <p><b>Planned:</b></p> <ul style="list-style-type: none"> <li>● Hazardous waste storage locations assessment for international good practices</li> <li>● In the maintenance and repair zone will be new construction, including oil discharge point</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p><b>Airports:</b> Section 1.5 – Solid and hazardous waste.</p> <p><b>General:</b> Section 1.6 – Waste management hierarchy and best practices.</p>                                                                            |
| Energy and climate | <p><b>Existing:</b></p> <ul style="list-style-type: none"> <li>● EDGE certificate for the T2 building (Focus Areas: Energy efficiency, water efficiency, and embodied energy in materials)</li> <li>● Airport has joined the ACI Zero Carbon program and is working on planning of long term carbon reduction. GHG emission sources for Scope-1 identified, waiting for verification</li> </ul> <p><b>Planned:</b></p> <ul style="list-style-type: none"> <li>● Upgrade of the CUP</li> <li>● Integration of Environment, Social and Governance (ESG) criteria into project design, including implementation of energy-efficient technologies (e.g. LED lighting, high-efficiency HVAC, and low-emission ground support equipment) to reduce operational carbon footprint.</li> <li>● Mitigation of fog-related disruptions through installation of ILS Category IIIB, allowing precision landings in low-visibility conditions.</li> <li>● New fuel facilities will let the storage of Jet A-1, which will positively impact decarbonization.</li> <li>● Operating protocols for dealing with heavy snowfall with increased usage of snow clearing fleet.</li> <li>● Mandatory procedures for aircrafts to shut down their auxiliary power units (APUs) and use ground power units (GPUs) when parked at a terminal, to reduce carbon footprint of aircraft movements.</li> </ul> | <p><b>General:</b> Section 1.1 – Energy conservation and GHG emissions.</p> <p><b>Airports:</b> Encourages energy efficiency in terminal operations.</p>                                                                        |

<sup>6</sup> The EDGE (Excellence in Design for Greater Efficiencies) certificate is a green building certification system developed by the International Finance Corporation (IFC), a member of the World Bank Group. It is designed to promote resource-efficient building design in emerging markets.

| Key topic                              | Embedded mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | World Bank Group EHS Guidelines                                                                                                                                                                                                                                 |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Biodiversity and habitat protection    | <p><b>Existing:</b></p> <ul style="list-style-type: none"> <li>Analysis of the ornithological situation and aircraft collisions with birds/wild animals at the aerodrome</li> <li>Implementing the Program for the prevention of dangerous presence of birds and other animals at the airfield</li> </ul> <p><b>Planned:</b></p> <ul style="list-style-type: none"> <li>N/A</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p><b>Airports:</b> Section 1.6 – Wildlife hazard management and habitat conservation.</p> <p><b>General:</b> Section 1.5 – Biodiversity conservation and sustainable management of living natural resources.</p>                                               |
| Soil and groundwater protection        | <p><b>Existing:</b></p> <ul style="list-style-type: none"> <li>Soil and Groundwater quarterly monitoring</li> <li>New drainage network</li> </ul> <p><b>Planned:</b></p> <ul style="list-style-type: none"> <li>Spill prevention</li> <li>Continuation of quarterly monitoring</li> <li>Soil remediation as part of the Fuel Farm upgrade</li> <li>Finalise the implementation of the recommendations and mitigation measures arising from the fuel farm assessment</li> <li>Production of map of potential contamination associated with the airport.</li> <li>Action plan for soil and groundwater remediation</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p><b>Fuel Storage:</b> Sections 1.1 &amp; 1.3 – Spill prevention, leak detection, and containment.</p> <p><b>Airports:</b> Fuel handling and storage practices.</p> <p><b>General:</b> Sections 1.5 &amp; 1.8 – Hazardous materials and contaminated land.</p> |
| Environmental monitoring and reporting | <p><b>Existing:</b></p> <ul style="list-style-type: none"> <li>Quarterly monitoring for soil, water and air with final report</li> <li>Ambient noise monitoring</li> <li>Annual Environmental and Social Report</li> <li>Air and noise monitoring as per local legislation</li> <li></li> </ul> <p><b>Planned:</b></p> <ul style="list-style-type: none"> <li>Improve the quality and content of reports</li> <li>Environment and Social staff special training on ESG</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p><b>General:</b> Section 1.7 – Monitoring and reporting requirements.</p> <p><b>Airports:</b> Recommends ongoing environmental performance tracking.</p>                                                                                                      |
| Community engagement and awareness     | <p><b>Existing:</b></p> <ul style="list-style-type: none"> <li>ALA's Stakeholder Engagement Plan (SEP) is being implemented for the airport's operation. It includes regular and ongoing communication with the communities and local authorities. Channels for communication with ALA include website, hotline, ALA availability for offline meetings, regular meetings with akimats, meetings with NGOs, when necessary, etc. Main topics for discussions are Noise Insulation Program (NIP) community outreach, addressing grievances, discussions of Sanitary Protection Zone (SPZ), Land Acquisition and Resettlement (LAR), Public Safety Zone (PSZ) with the Government stakeholders. Stakeholder engagements' records are maintained.</li> <li>Engagement with authorities and the government on implementation of SPZ and PSZ</li> <li>Publicization of the NIP</li> </ul> <p><b>Planned:</b></p> <ul style="list-style-type: none"> <li>SEP for the previous construction period will be updated for the new project developments accordingly and include additional meetings and locations related to the NIP. Regular meetings with the communities and local authorities, using different channels for grievances and feedback, informing local communities about the project activities will be at place when require, in the form required. Stakeholder engagements' records are maintained.</li> </ul> | <p><b>General:</b> Section 2.0 – Community engagement and disclosure.</p> <p><b>Airports:</b> Emphasizes stakeholder involvement in noise and land use planning.</p>                                                                                            |

## 2.8 Construction activities

- 2.8.1 The programme, activities and materials proposed as part of the construction phase of the Project are presented below. This information is liable to change slightly with the continuation of detailed design. However, such changes would be small in nature and are not considered to affect the Project materially.

### Construction timeline

- 2.8.2 The programme of construction works is currently proposed as follows:

**Table 2.4: Proposed construction programme**

| Activity                                                               | 2025 | 2026 | 2027 | 2028 |
|------------------------------------------------------------------------|------|------|------|------|
| Rehabilitation of main runway                                          |      |      |      |      |
| New taxiway                                                            |      |      |      |      |
| New cargo apron                                                        |      |      |      |      |
| Rehabilitation of existing VIP apron                                   |      |      |      |      |
| New de-icing pad                                                       |      |      |      |      |
| Rehabilitation of parking stands                                       |      |      |      |      |
| New in-flight catering facility                                        |      |      |      |      |
| Fuel farm storage expansion and improvement to existing infrastructure |      |      |      |      |
| Domestic terminal renovation                                           |      |      |      |      |
| Drainage and wastewater treatment                                      |      |      |      |      |
| New head office and training centre                                    |      |      |      |      |
| Aerodrome and ground handling village                                  |      |      |      |      |
| New landside and airside warehouses                                    |      |      |      |      |
| Other improvements                                                     |      |      |      |      |

### Construction methods

- 2.8.3 The EPC Contractors will adhere to industrial good practice as detailed within the appropriate method statements for the construction works. The outline method statements will be updated with any detailed design changes as the Project moves forward to construction.
- 2.8.4 Health and safety will be key, and measures will be outlined in the ESMP and safety plans that will be prepared for the works. The majority of the works will not take place in areas accessible to the public. Appropriate demarcation boundaries will be provided around the works to mitigate against public access to the site and protect their safety.

### Construction hours

- 2.8.5 It is proposed that working hours will be from 08:00 to 17:00 Monday to Friday, with special consideration made to emergency or special activities whereby works would take place outside of those hours. These situations would be agreed with the relevant authorities in advance on a case-by-case basis. Night-time working may be utilised for transportation of the main structural items. This will be undertaken after 20:00 in order to minimise potential disruption to the local highway network.

### Construction materials

- 2.8.6 The proposed materials for the Project are shown in Table 2.5, however may be subject to change as part of the detailed design. Materials are expected to be procured primarily from Kazakhstan.

**Table 2.5: Construction materials**

| Category                               | Material description              |
|----------------------------------------|-----------------------------------|
| Airport Pavement - Utility Diversion   | Electrical Cables                 |
| Airport Pavement - Utility Diversion   | HDPE and Steel Pipes              |
| Airport Pavement - Stormwater Drainage | Precast concrete pipes            |
| Airport Pavement - Stormwater Drainage | HDPE pipes and Gutters            |
| Airport Pavement - Stormwater Drainage | Grated covers                     |
| Airport Pavement - Earthworks          | Soil for filling                  |
| Airport Pavement - Subbase             | Granular subbase                  |
| Airport Pavement - Subbase             | Wet mix macadam                   |
| Airport Pavement - Subbase             | Geotextile                        |
| Airport Pavement - Surface             | Asphalt binder and wearing course |
| Airport Pavement - Surface             | Pavement quality concrete         |
| Airport Pavement - Marking             | Thermoplastic paint               |
| Airport Pavement - Safety              | Runway lighting cables            |
| Airport Pavement - Safety              | Lighting armatures                |
| Catering Facility - Structural         | Ready-mix concrete                |
| Catering Facility - Structural         | Steel reinforcement               |
| Catering Facility - Structural         | Waterproofing sheets              |
| Catering Facility - Architectural      | Ceramic tiles                     |
| Catering Facility - Architectural      | Aluminium windows and doors       |
| Catering Facility - MEP                | HVAC system                       |
| Catering Facility - MEP                | Cold room panels                  |
| Fuel Farm - Civil                      | Reinforced concrete               |
| Fuel Farm - Civil                      | Steel rebar                       |
| Fuel Farm - Civil                      | HDPE membrane                     |
| Fuel Farm - Mechanical                 | Carbon/stainless steel pipes      |
| Fuel Farm - Mechanical                 | Fuel storage tanks                |
| Fuel Farm - Mechanical                 | Valves and fittings               |
| Fuel Farm - Mechanical                 | Fuel pumps and meters             |
| Fuel Farm - Firefighting               | Fire pumps & monitors             |
| Fuel Farm - Firefighting               | Fire detection system             |
| Fuel Farm - Electrical                 | Transformers and cables           |
| Fuel Farm - Electrical                 | SCADA/PLC system                  |

## Construction plant

- 2.8.7 Table 2.6 outlines the construction equipment that YDA anticipates will be required for the Project components 1 to 6 outlined in Table 2.2.
- 2.8.8 As the EPC Contractors for the other Project components have not yet been appointed, it is not known what construction plant may be required for those components. However, it is anticipated to be similar to the YDA plant requirements.

**Table 2.6: YDA anticipated equipment**

| Equipment            | Number |
|----------------------|--------|
| Mobile crane 25 tons | 2      |
| Loader               | 4      |

| Equipment                                       | Number |
|-------------------------------------------------|--------|
| Greyder                                         | 3      |
| Excavator                                       | 10     |
| Dozer                                           | 3      |
| Backhoe-loader                                  | 4      |
| Water tanker                                    | 4      |
| Truck                                           | 75     |
| Compressor                                      | 2      |
| Pick-up                                         | 12     |
| Mobile lighting machine 22 KVA                  | 3      |
| Generator 50 KVA                                | 3      |
| Generator 400 KVA                               | 1      |
| Generator 1000 KVA                              | 2      |
| Asphalt plant 240 tn/hour                       | 1      |
| Concrete batching plant 160m <sup>3</sup> /hour | 1      |
| Concrete batching plant 180m <sup>3</sup> /hour | 1      |
| Mechanical ground mixing plant                  | 1      |
| Crushed stone plant                             | 1      |
| Concrete finisher                               | 1      |
| Asphalt finisher                                | 4      |

## Construction vehicles and routes

- 2.8.9 There are four entrances to the airport. The access to the Cargo Entrance is through Zakarpatskaya Street, and the access to the Northern and Southern Checkpoints are through Ahmetova Street. The construction vehicles are anticipated to utilise Ahmetova and Zakarpatskaya Streets as the primary access to the airport, avoiding residential streets where possible to minimise impacts on local communities. During construction there is no requirement for road closures and existing traffic is not anticipated to be affected. The transportation of large items such as steel beams will be undertaken in the evening in order to minimise potential disruption to highways.

## Construction compounds

- 2.8.10 Construction compounds and material laydown areas are expected to be located within the airport boundary. 24-hour security will be in place during construction to ensure the construction fencing is maintained and access from the general public prohibited.
- 2.8.11 All construction works will be separated from airside activities with appropriate fencing, as per International Civil Aviation Organization (ICAO) Regulations.
- 2.8.12 To support the implementation of the Project, required construction compounds will be established across the site. These compounds will serve as centralised hubs for construction management, logistics, material storage, equipment maintenance, and worker welfare throughout the duration of the works. The construction compounds will be designed to accommodate the diverse scope of activities associated with the Project components.
- 2.8.13 A typical compound is expected to include modular site offices for project management and contractors, secure storage areas for construction materials and equipment, designated zones for machinery parking and maintenance, and welfare facilities for workers (including canteens, toilets, showers, and first aid stations). Dedicated areas will also be allocated for waste management, environmental monitoring, and emergency response.

- 2.8.14 As required, the compounds will host asphalt and concrete batching plants, which are essential for the rehabilitation of airside pavements and the construction of new infrastructure. These plants will be strategically located to minimise haul distances and will be operated in accordance with environmental and safety standards to control emissions, dust, and noise. Other specialised facilities may include crushing and screening units, rebar yards, and formwork storage areas.
- 2.8.15 At this stage, detailed design of the construction compounds is still under development. Final layouts, specifications, and operational procedures will be prepared by the appointed EPC Contractors. These will be documented in the Contractor's Environmental and Social Management Plan (C-ESMP) and will be subject to review and approval by the Project's Environment and Social team.
- 2.8.16 All construction compounds will be developed and operated in accordance with the EHS requirements stipulated under the EPC contract. This includes provisions for dust and noise control, spill prevention, stormwater management, and occupational health and safety, as mentioned in Table 2.3. The EPC Contractors will be responsible for ensuring that all compound activities comply with national regulations and international best practice.

### Staff and welfare

- 2.8.17 YDA construction staff are anticipated to be accommodated within an accommodation camp approximately 10km from the airport. The camp will include offices, dormitories, kitchen, warehouse, mess hall and market. Construction workers will travel to site via shared minibuses or public transport. Welfare facilities will be provided on site. A site office will be provided for the duration of the construction works, along with a mess hall, toilets and changing rooms.
- 2.8.18 As the EPC Contractors for the other Project components have not yet been appointed, it is not known what staff and welfare arrangements they would have.

## 2.9 Operational activities

- 2.9.1 Following the completion of construction works, the airport will transition the newly developed and rehabilitated infrastructure into the operational phase, during which all Project components will be fully commissioned and brought into service. This phase will involve a broad range of airside and landside activities, with increased operational complexity and environmental and social considerations.

### Airside operations

- 2.9.2 The rehabilitation of the main runway, construction of a new taxiway, and expansion of apron areas will support increased aircraft movements and accommodate a wider range of aircraft types. Airside operations will include:
- Aircraft marshalling, towing, and parking
  - Baggage and cargo loading/unloading
  - Passenger boarding and disembarkation
  - Aircraft cleaning and catering services
  - Aerodrome movement area inspection
  - Winter services (de/anti-icing of airside pavements)
  - Wildlife services
  - Fire-fighting protection
  - Emergency management



- Passenger and crew bus transportation
- Oxygen and nitrogen services

2.9.3 The new cargo apron and associated airside warehouses will facilitate expanded freight handling operations, requiring enhanced logistics coordination and security protocols.

### **Refuelling operations**

2.9.4 The expanded fuel farm will support increased fuel storage and distribution capacity. Aircraft refuelling will be conducted in accordance with international aviation fuel handling standards, with strict adherence to:

- Spill prevention and containment measures
- Fire safety and emergency response protocols
- Vapour recovery and emissions control systems

2.9.5 All refuelling activities will be monitored under the airport's Environmental and Social Management System (ESMS).

### **De-icing operations**

2.9.6 The newly constructed de-icing pad will enable safe and efficient aircraft de-icing during winter operations. Activities will involve the application of glycol-based fluids, with dedicated containment and drainage systems to prevent environmental contamination. De-icing operations will be governed by a seasonal operational plan, including:

- Fluid storage and handling procedures
- Waste fluid collection and treatment
- Weather monitoring and operational coordination

### **Terminal and passenger services**

2.9.7 The renovated domestic terminal (T1) will accommodate increased passenger throughput and improved service delivery. Operational activities will include:

- Passenger check-in, security screening, and boarding
- Retail and concession operations
- Terminal cleaning, maintenance, and waste management

### **Support facilities and staffing**

2.9.8 The new head office and training centre will centralise administrative functions and support ongoing staff development. The aerodrome and ground handling village will house operational teams, equipment storage, and maintenance workshops.

2.9.9 To support expanded operations, the airport will require:

- Additional operational and technical personnel, including ground handlers, maintenance staff, safety officers, and administrative support
- Enhanced maintenance regimes for pavements, lighting, signage, and mechanical systems
- Upgraded IT and communications infrastructure to support real-time coordination and monitoring

## Environmental, health and safety management

- 2.9.10 All operational activities will be governed by the airport's ESMS, which will be updated to reflect the expanded scope of operations. Key areas of focus will include:
- Noise and air quality monitoring
  - Stormwater and wastewater management
  - Occupational health and safety compliance
  - Emergency preparedness and response planning
- 2.9.11 The operational phase will be subject to ongoing environmental and social monitoring, in line with national regulations and international best practice.

## 2.10 Decommissioning activities

- 2.10.1 Decommissioning and demolition activities are not included within the scope of this ESIA, as such actions are not reasonably foreseeable within the current planning horizon. Should these activities be proposed in the future, they would be subject to separate environmental and social assessments in accordance with applicable legislation and best practice. This should include the development of a decommissioning plan at least five years prior to closure.
- 2.10.2 The Project components are expected to have a lifespan of 20 to 40 years, depending on the component / equipment, assuming appropriate maintenance. As the expected time of decommissioning is far in the future, it is unknown what decommissioning procedures will be present then. However, it is assumed that decommissioning would take place using the good international industry practice at the time, with waste materials managed in line with the waste hierarchy to promote re-use and circular economy principles.
- 2.10.3 As part of the on-going maintenance of these buildings, components that comprise furnishings and mechanical engineering plant are likely to have shorter lifespans. The lifespans of such items will vary and also depend on the operational requirements of the airport which, if changed, may render some items obsolete. However, good maintenance will be employed to maximise the lifespan of all such items wherever possible. Where individual items need to be removed, the principles of the waste hierarchy should be followed so that items are re-used or recycled wherever possible.

## 3 Policy, legal and institutional framework

### 3.1 Overview

- 3.1.1 This chapter discusses the policy, legal and institutional framework within which the ESIA was conducted. National and international regulations, including prospective Lender requirements and standards, are discussed along with relevant international agreements and conventions to which Kazakhstan is a party.

### 3.2 International standards and guidelines

- 3.2.1 IFC, DEG, EBRD and EDB are considering financing the Project. The ESIA has been prepared in accordance with the standards of IFC and EBRD, which serve as the primary reference frameworks. These standards require a comparable level of environmental and social compliance, and are listed below alongside other relevant international requirements:

- IFC Performance Standards on Environmental and Social Sustainability (2012)
- IFC Environmental, Health, and Safety (EHS) Guidelines, including General (2007), Airports (2007), and Fuel Storage Facilities (2007)
- EBRD Environmental and Social Policy and Environment and Social Requirements (2024)
- EBRD Sub Sector Environmental and Social Guideline – Air Transportation (2014)
- EBRD Guidance Notes
- EU Council Directive 82/501/EEC on the major-accident hazards of certain industrial activities (1982)
- International Civil Aviation Organization (ICAO) occupational and public safety requirements for aerodromes
- ICAO Guidelines for States Concerning the Management of Communicable Disease Posing a Serious Public Health Risk
- International Labour Organization (ILO) Core Conventions on labour rights and occupational health and safety
- The Equator Principles (2020)
- European Commission Environmental Impact Assessment (EIA) Guidelines
- Good International Industry Practice, including ICAO and IATA standards

- 3.2.2 The IFC PSs and the EBRD ESRs are considered in more detail in the following sections.

#### **Lenders environmental and social standards**

- 3.2.3 The IFC PSs and EBRD ESRs are internationally recognised benchmarks for identifying and managing environmental and social risks. Both frameworks are widely adopted by financial institutions and project developers to guide responsible investment and sustainable project development. The IFC has established eight PS, while the EBRD applies ten ESR, each providing detailed guidance on assessing impacts and implementing measures to avoid, minimise, and manage socio-environmental risks throughout the project lifecycle.
- 3.2.4 Table 3.1 presents a brief description of IFC PSs and EBRD ESRs, and their relevance to the Project.

**Table 3.1: Comparative overview of IFC PSs and EBRD ESRs, including scope and triggers for application**

| Topic                                      | IFC PSs                                                                               | EBRD ESRs                                                                              | Scope                                                                 | Trigger for Application                                           | Potentially Applicable to the Project?                                                                                                                                                                |
|--------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environmental & Social Risk Management     | PS1: Assessment and Management of Environmental and Social Risks and Impacts          | ESR1: Assessment and management of environmental and social risks and impacts          | Project-level ESMS, stakeholder engagement, impact assessment         | All projects financed directly or through intermediaries          | Yes                                                                                                                                                                                                   |
| Labour and Working Conditions              | PS2: Labor and Working Conditions                                                     | ESR2: Labor and Working Conditions                                                     | Worker rights, health and safety, grievance mechanisms                | Employment of workers under project scope                         | Yes                                                                                                                                                                                                   |
| Resource Efficiency & Pollution Prevention | PS3: Resource Efficiency and Pollution Prevention                                     | ESR3: Resource Efficiency and Pollution Prevention and control                         | Emissions, energy use, waste, hazardous materials                     | Projects with potential pollution or resource use impacts         | Yes                                                                                                                                                                                                   |
| Community Health, Safety & Security        | PS4: Community Health, Safety, and Security                                           | ESR4: Health, safety and security                                                      | Risks to communities from project activities                          | Projects with physical or operational risks to nearby populations | Yes                                                                                                                                                                                                   |
| Land Acquisition & Resettlement            | PS5: Land Acquisition and Involuntary Resettlement                                    | ESR5: Land acquisition, restrictions on land use and involuntary resettlement          | Physical/ economic displacement, compensation, livelihood restoration | Projects involving land acquisition or displacement               | Not triggered for Project Horizon <sup>1</sup>                                                                                                                                                        |
| Biodiversity & Natural Resources           | PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources | ESR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources | Critical habitats, ecosystem services, invasive species               | Projects in sensitive ecological areas or affecting biodiversity  | Yes                                                                                                                                                                                                   |
| Indigenous Peoples                         | PS7: Indigenous Peoples                                                               | ESR7: Indigenous Peoples                                                               | FPIC, cultural heritage, participation                                | Projects affecting Indigenous Peoples or their territories        | No - No indigenous communities have been identified in the vicinity of the airport.                                                                                                                   |
| Cultural Heritage                          | PS8: Cultural Heritage                                                                | ESR8: Cultural Heritage                                                                | Archaeological, historical, spiritual sites                           | Projects in areas with known or potential cultural heritage       | No - No construction or operational impacts on cultural heritage are likely. The implementation of a Chance Find procedure, in line with international standards, is deemed sufficient to address any |

| Topic                                           | IFC PSs         | EBRD ESRs                     | Scope                                            | Trigger for Application                 | Potentially Applicable to the Project?    |
|-------------------------------------------------|-----------------|-------------------------------|--------------------------------------------------|-----------------------------------------|-------------------------------------------|
|                                                 |                 |                               |                                                  |                                         | remaining cultural heritage requirements. |
| Stakeholder Engagement & Information Disclosure | Embedded in PS1 | ESR10: Stakeholder Engagement | Consultation, grievance mechanisms, transparency | All projects with potential E&S impacts | Yes                                       |

<sup>1</sup> Land acquisition and resettlement are not triggered under Project Horizon. The Project is located within the existing operational airport boundary, with limited exceptions, including the new head office and training centre and a small parcel as part of the new taxiway and no additional land acquisition is required for the development of Project Horizon. A Land Acquisition and Resettlement Framework (LARF) was prepared under the Original Deal, referring to current ALA operations, and remains applicable to the Project Horizon. Should any land acquisition be required in future, it will be addressed in accordance with the provisions of the LARF and aligned with IFC PS5 and EBRD PR5. The LARF will be re-disclosed as part of the ESIA documentation package.

## 3.3 Regional and international standards and guidelines

3.3.1 International legislation considered relevant for this ESIA is presented in Table 3.2.

**Table 3.2: Relevant international legislation**

| Topic                                                                                                     | Legislation                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| International Safeguards and Best Practices                                                               | International Labour Organisation (ILO) Convention No.81 On Labour Inspection in Industry and Commerce (1947)                                     |
|                                                                                                           | ILO Convention No.148, On the protection of workers from occupational risk of air pollution, noise and vibration in the workplace (1977)          |
|                                                                                                           | ILO Convention No.155, On Safety and Health at Work and the Environment (1981)                                                                    |
|                                                                                                           | ILO Convention No.162, On Safety in the Use of Asbestos (1986)                                                                                    |
|                                                                                                           | ILO Convention No.167, Safety and Health in Construction (1988)                                                                                   |
| Kazakhstan ratified the following eight fundamental conventions of the International Labour Organization: | C029 - Forced Labour Convention, 1930 (No. 29) ratified on 18 May 2001                                                                            |
|                                                                                                           | C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87) ratified on 13 Dec 2000                           |
|                                                                                                           | C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98) ratified on 18 May 2001                                              |
|                                                                                                           | C100 - Equal Remuneration Convention, 1951 (No. 100) ratified on 18 May 2001                                                                      |
|                                                                                                           | C105 - Abolition of Forced Labour Convention, 1957 (No. 105) ratified on 18 May 2001                                                              |
|                                                                                                           | C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111) ratified on 06 Dec 1999                                              |
|                                                                                                           | C138 - Minimum Age Convention, 1973 (No. 138) ratified on 18 May 2001                                                                             |
|                                                                                                           | C182 - Worst Forms of Child Labour Convention, 1999 (No. 182) ratified on 26 Feb 2003                                                             |
| UN conventions ratified by Kazakhstan                                                                     | CAT Convention against Torture and Other Cruel Inhuman or Degrading Treatment or Punishment ratified on 26 Aug 1998 (a)                           |
|                                                                                                           | CAT-OP Optional Protocol of the Convention against Torture ratified on 22 Oct 2008                                                                |
|                                                                                                           | CCPR International Covenant on Civil and Political Rights ratified on 24 Jan 2006                                                                 |
|                                                                                                           | CED Convention for the Protection of All Persons from Enforced Disappearance ratified on 27 Feb 2009 (a)                                          |
|                                                                                                           | CEDAW Convention on the Elimination of All Forms of Discrimination against Women ratified on 26 Aug 1998 (a)                                      |
|                                                                                                           | CERD International Convention on the Elimination of All Forms of Racial Discrimination ratified on 26 Aug 1998 (a)                                |
|                                                                                                           | CESCR International Covenant on Economic, Social and Cultural Rights ratified on 24 Jan 2006                                                      |
|                                                                                                           | CRC-OP-AC Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict ratified on 10 Apr 2003 |

| Topic | Legislation                                                                                                                                                       |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | CRC-OP-SC Optional Protocol to the Convention on the Rights of the Child on the sale of children child prostitution and child pornography ratified on 24 Aug 2001 |
|       | CRPD Convention on the Rights of Persons with Disabilities ratified on 21 Apr 2015                                                                                |

## 3.4 National requirements

3.4.1 Relevant policies, laws and institutional arrangements have been reviewed as part of this ESIA to establish linkages to all phases of construction and operation. These policies, laws and institutional arrangements are described in Table 3.3.

**Table 3.3: Relevant regulations and standards**

| Framework               | Policy                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Policy Framework        | The Concept for Transition of the Republic of Kazakhstan towards Green Economy until 2050 (2013).                                                                                                                                                                                                                                                                                                                                              |
|                         | Ratified European Council directives 85/337/EEC Environmental Impact; 92/43/EEC 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora; 79/409/EEC 1979 on the Conservation of Birds; 2004/35/EC 2004 on Environmental Liability.<br>Ratified conventions on the Protection of Migrating Wildlife; on Biological Diversity; on Conservation of Migratory Species of Wild Animals and on Access to Environmental Information. |
| Legal Framework         | The Constitution of the Republic of Kazakhstan (1995)                                                                                                                                                                                                                                                                                                                                                                                          |
|                         | Sanitary and epidemiological requirements for sanitary protection zones of production facilities (2015)                                                                                                                                                                                                                                                                                                                                        |
|                         | Labour Code, 2015                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                         | Civil Protection Code, 2014                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                         | Fire Safety Rules, 2011                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                         | General Fire Safety Requirements, 2009                                                                                                                                                                                                                                                                                                                                                                                                         |
|                         | Industrial Safety of Hazardous Industrial Facilities Law, 2002                                                                                                                                                                                                                                                                                                                                                                                 |
|                         | Environmental Code, 2021 (includes the establishment and management of SPZ)                                                                                                                                                                                                                                                                                                                                                                    |
|                         | Environmental Expertise conducting rules, 2017                                                                                                                                                                                                                                                                                                                                                                                                 |
|                         | Standards of the State Services in Environmental Protection, 2015                                                                                                                                                                                                                                                                                                                                                                              |
|                         | Public hearings conducting rules, 2017                                                                                                                                                                                                                                                                                                                                                                                                         |
|                         | Instruction on conducting EIA, 2007                                                                                                                                                                                                                                                                                                                                                                                                            |
|                         | Environmental information disclosure rules, 2007                                                                                                                                                                                                                                                                                                                                                                                               |
|                         | Sanitary epidemiological requirements to the non-residential buildings, 2015                                                                                                                                                                                                                                                                                                                                                                   |
|                         | Law on sanitary epidemiological wellbeing of population, 2006                                                                                                                                                                                                                                                                                                                                                                                  |
|                         | Population health protection law, 2006                                                                                                                                                                                                                                                                                                                                                                                                         |
|                         | Law on compulsory life insurance for personnel, 2005                                                                                                                                                                                                                                                                                                                                                                                           |
|                         | Rules for equipping buildings with automatic fire extinguishing system and alarms and evacuation management, 2016                                                                                                                                                                                                                                                                                                                              |
|                         | ICAO standards for safety, noise, fuel consumption and engine emissions                                                                                                                                                                                                                                                                                                                                                                        |
| Institutional Framework | Law on architectural, urban planning and construction activities (2001)                                                                                                                                                                                                                                                                                                                                                                        |
|                         | Ministry of Ecology, Geology and Natural Resources                                                                                                                                                                                                                                                                                                                                                                                             |
|                         | Civil Aviation Committee Inspectorate                                                                                                                                                                                                                                                                                                                                                                                                          |
|                         | Flight Safety Inspectorate                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                         | Sanitary Epidemiological Service                                                                                                                                                                                                                                                                                                                                                                                                               |
|                         | Ministry of Energy (waste)                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                         | Ministry of Transport and Communications                                                                                                                                                                                                                                                                                                                                                                                                       |
|                         | Almaty City Council                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                         | Consumer Rights Protection Committee                                                                                                                                                                                                                                                                                                                                                                                                           |

| Framework         | Policy                                                                                                                                                                                                                                                                                       |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Public engagement | Rules on Public Hearing Conduction approved by Order of Minister of Environmental Protection of RK No.135-p of 07.05.2007 as amended on 08.09. 2017.                                                                                                                                         |
|                   | Rules on Access to Environmental Information Relevant to Environmental Impact Assessment Procedure and Decision-Making Process on Proposed Economical and Other Activities, approved by Order of Minister of Environmental Protection of RK No.238-p of 25.07.2007 as amended on 21.06.2016. |

## 4 ESIA scope and methodology

### 4.1 Overview

4.1.1 This chapter presents the ESIA scope and methodology that have been employed to form the basis of the assessments that are presented in this ESIA.

### 4.2 ESIA screening

4.2.1 ESIA screening has not taken place as it is considered that an ESIA is required for this Project due to its potential to generate adverse environmental and social impacts, and to ensure alignment with the Lenders' environmental and social standards. Therefore, the ESIA process commenced with the scoping stage.

### 4.3 ESIA scoping

#### Technical scope

4.3.1 The scope of the assessment required for the ESIA is well understood following the extensive environmental and social monitoring that has taken place since a previous ESIA was conducted for airport terminal expansion works and associated infrastructure development at the airport in 2022 (hereafter referred to as "the 2022 ESIA"). The Lender's E&S Advisor has also been in place since the 2022 ESIA, helping to increase understanding of E&S issues at the airport. Therefore, the Lenders have stated that a full Scoping Report is not required. Instead, a Scoping Review Summary Report was prepared, to review the proposed scope for the ESIA, provided by the Lenders within the Terms of Reference, and other relevant documents, and to consolidate the ESIA scope in the form of a brief report.

4.3.2 The confirmed scope of the ESIA is as follows:

**Table 4.1: Agreed scope of the ESIA**

| Impact/Aspect      | Construction | Operation | Justification for scoping out (if applicable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|--------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air quality        | Scope in     | Scope in  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Biodiversity       | Scope in     | Scope in  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Climate resilience | Scope out    | Scope in  | Scoped out of construction phase as climate impacts would occur over the longer-term scale.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Community          | Scope in     | Scope in  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Cultural heritage  | Scope out    | Scope out | The 2022 ESIA identified one historical asset, the VIP Terminal Building, which has been relocated as part of the previous development. The relocated VIP terminal building has lost its spatial axial alignment and relationship with Mailin Street, which was previously mitigated by a museum display within the international terminal. Cultural heritage is therefore scoped out of this ESIA on the basis that no construction or operational impacts on the relocated VIP terminal, the historic landscape, or buried archaeology are likely. |
| Geology and soils  | Scope in     | Scope out | Scoped out for the operational phase due to only minor risk of operational activities contamination which can be controlled through appropriate management plan implementation.                                                                                                                                                                                                                                                                                                                                                                      |
| Greenhouse gases   | Scope in     | Scope in  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |



| Impact/Aspect         | Construction | Operation | Justification for scoping out (if applicable)                                                                                                                                         |
|-----------------------|--------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Landscape and visual  | Scope out    | Scope out | Scoped out on the basis that the proposed works are considered to be in-keeping within the context of an operational airport so as not to have the potential for significant effects. |
| Noise                 | Scope in     | Scope in  |                                                                                                                                                                                       |
| Traffic and transport | Scope in     | Scope in  |                                                                                                                                                                                       |
| Waste and resources   | Scope in     | Scope in  |                                                                                                                                                                                       |
| Water resources       | Scope in     | Scope in  |                                                                                                                                                                                       |
| Workers               | Scope in     | Scope in  |                                                                                                                                                                                       |

## Assessment scope

4.3.3 In accordance with national and international requirements, the ESIA will consider the following:

- Environmental, social, labour, health, safety and security risks and impacts of the Project.
- Potential impacts and resulting effects that may arise for each key stage of the Project that can be reasonably assessed at this stage, including pre-construction, construction and operation.
- Potential third-party impacts including supply chain considerations.
- Identification of beneficial and adverse, direct and indirect as well as cumulative impacts and effects of the Project related to the bio-physical and the socio-economic environment.

4.3.4 Cumulative effects are considered, examining the combination of multiple impacts upon a receptor as a result of multiple effects resulting from the Project together with other nearby developments. As with the technical assessments, significant effects and appropriate mitigation are identified as part of the assessment of cumulative effects, building upon the effects identified in the technical chapters.

4.3.5 As discussed in Section 2.10, due to the length of the Project lifetime, the impacts of decommissioning at the end of Project life cannot be properly predicted at this stage because the baseline conditions are likely to have changed notably by this phase of the Project. This ESIA therefore does not assess the likely impacts that may arise from the decommissioning phase. A decommissioning plan must be developed five years prior to decommissioning, including a full impact assessment and mitigation plan.

4.3.6 Should any decommissioning or refurbishment occur, consultation will be undertaken prior to these activities to appropriately assess likely environmental and social impacts based on an adapted baseline, to understand if assessments, including ESIA, are required, and to ensure the works conform with necessary local requirements.

4.3.7 For individual items within the infrastructure that need to be replaced during the Project's lifetime (such as plant or furnishings), these should follow the Operational Waste Management Plan for the airport, prioritising re-use and recycling wherever possible.

4.3.8 This ESIA is based on the general assumption that baseline conditions are unlikely to change significantly between the commencement of construction and its completion.

## 4.4 Impact assessment process

4.4.1 The impact assessment methodology followed is in line with national and international requirements. The key steps are to: identify the study area and area(s) of influence; characterise the existing baseline; determine the impacts that may occur as a result of the construction and operation of the Project; identify how these impacts may affect the baseline conditions; evaluate the significance of likely effects; and identify mitigation and enhancement

measures to reduce any adverse effects and maximise any benefits resulting from the Project. The approach to these stages of the ESIA process is discussed below.

## 4.5 ESIA study area

- 4.5.1 The ESIA study area represents the geographic and contextual boundaries within which the Project's potential environmental and social impacts are assessed. This area is tailored to the nature, scale, and potential risks of the Project and it is used to collect baseline data, conduct field surveys, and understand the existing context.

### Project Affected Area

- 4.5.2 The Project Affected Area (PAA) is defined as the area of land that will be used by the Project either permanently or temporarily. At this stage, no permanent land acquisition is anticipated, and no additional land take is currently proposed for temporary construction-related structures, subject to confirmation during detailed design.
- 4.5.3 One of the Project components, the new head office and training centre, is located outside the airport's operational boundary, but within an existing built plot already owned by Almaty International Airport. This land parcel currently hosts an office building, which will be refurbished, and a training centre will be constructed within the same plot. As the land is already under airport ownership and previously developed, no new land acquisition is required for this component.

### Area of Influence

- 4.5.4 The Area of Influence (AoI) encompasses all land and water, that may be directly or indirectly impacted by the Project and therefore extends beyond the Airport boundary. This includes communities and areas adjacent to the PAA that may experience impacts during both the construction and operational phases of the Project such as noise, visual intrusion, traffic, or air quality impacts.
- 4.5.5 The AoI is defined on a topic-specific basis, with each environmental and social discipline determining its respective AoI according to the nature, extent, and significance of potential impacts. This approach ensures that all relevant receptors and impact pathways are appropriately considered in the assessment process.

## 4.6 Baseline conditions consideration

- 4.6.1 Baseline information has been collated from a range of sources including primary data collection, secondary data collection, publicly available information and through consultation.
- 4.6.2 Primary data was collected through two Mott MacDonald site visits (11 to 20 June 2025 and 7 to 11 July 2025) and socio-economic surveys undertaken by EcoSocio Analysts from 28 June 2025 to 25 July 2025.
- 4.6.3 In addition, baseline data was collected from desktop studies of available secondary data including websites, and articles and reports from local authorities, ministries, government organisations, civil society organisations, non-governmental organisations (NGOs), local media, and business groups. Relevant secondary sources used to support the assessment process are referenced in the relevant impact assessment sections

## 4.7 Assessment methodology

- 4.7.1 The ESIA will identify impacts and report on the likely significant environmental or social effects that result from these impacts. The criteria for determining significance are specific for each

environmental and social aspect and will be defined in the specialist chapters within the ESIA itself. For each impact the likely magnitude of the impact and the sensitivity of the receptor will be defined. Criteria for the definition of magnitude and sensitivity are summarised in the sections below.

4.7.2 The following types of effect are considered within this ESIA:

- **Direct effects** – effects which could arise from activities which form an integral part of the Project
- **Indirect effects** – effects which could arise from activities not explicitly forming part of the Project
- **Permanent effects** – effects which could result from an irreversible change to the baseline environment, or which persist for the near future, and occur during the construction or operational stages
- **Temporary effects** – effects which could persist for a limited period only and occur mainly during construction
- **Positive effects** – effects which could have a beneficial influence on receptors and resources
- **Negative effects** – effects which could have an adverse influence on receptors and resources

## Magnitude criteria

4.7.3 The magnitude of a change or impact resulting from the Project is categorised as major, moderate, minor or negligible based on consideration of parameters such as:

- Scale of the impact – how intense or severe the extent of the impact is likely to be
- Duration of the impact – ranging from ‘beyond decommissioning’ to ‘temporary with no detectable impact’
- Spatial extent of the impact (for instance, within the site boundary, within district, regionally, nationally and internationally)
- Reversibility – ranging from ‘permanent requiring significant intervention to return to baseline’ to ‘no change’
- Likelihood – ranging from ‘occurring regularly under typical conditions’ to ‘unlikely to occur’

4.7.4 Table 4.2 presents criteria for determining the impact magnitude.

**Table 4.2: Criteria for determining impact magnitude**

| Category   | Description (adverse impacts)                                                                                                                                                                                                                                                                                    |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Major      | Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature and requiring significant intervention to return to baseline; would violate national standards or Good International Industry Practice without mitigation for adverse impacts. |
| Moderate   | Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.                                                                                                                                                                                                |
| Minor      | Detectable but minor change to the specific conditions assessed.                                                                                                                                                                                                                                                 |
| Negligible | No perceptible change to the specific conditions assessed.                                                                                                                                                                                                                                                       |

## Sensitivity criteria

4.7.5 Sensitivity is specific to each topic and the environmental resource or population affected, with criteria generally defined on the basis of baseline information. Criteria for determining sensitivity of receptors are outlined in Table 4.3.

**Table 4.3: Criteria for determining the sensitivity of a receptor**

| Category   | Description                                                                                                                             |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| High       | Receptor (human, physical or biological) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation. |
| Medium     | Receptor with little capacity to absorb proposed changes or limited opportunities for mitigation.                                       |
| Low        | Receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation.                                        |
| Negligible | Receptor with good capacity to absorb proposed changes or and good opportunities for mitigation.                                        |

## Attribution of significance of impacts

- 4.7.6 Potential impacts are attributed significance taking into account the interaction between the magnitude of an impact and the sensitivity of a receptor, as presented in the matrix shown in Table 4.4.

**Table 4.4: Significance attribution matrix**

|             |            | Magnitude |            |            |            |            |            |          |
|-------------|------------|-----------|------------|------------|------------|------------|------------|----------|
|             |            | Adverse   |            |            | Neutral    | Beneficial |            |          |
|             |            | Major     | Moderate   | Minor      | Negligible | Minor      | Moderate   | Major    |
| Sensitivity | High       | Major     | Major      | Moderate   | Negligible | Moderate   | Major      | Major    |
|             | Medium     | Major     | Moderate   | Minor      | Negligible | Minor      | Moderate   | Major    |
|             | Low        | Moderate  | Minor      | Negligible | Negligible | Negligible | Minor      | Moderate |
|             | Negligible | Minor     | Negligible | Negligible | Negligible | Negligible | Negligible | Minor    |

- 4.7.7 The objective of the ESIA is to identify the likely significant effects of the Project. Effects that have been evaluated as being 'Moderate' or 'Major' are considered to be significant effects. Consequently, effects that are 'Minor' or 'Negligible' are not significant.
- 4.7.8 Effects considered of moderate or major significance will receive the most focus and resources for managing. However, there will be prevention and control measures recommended for most environmental and social aspects.

## Cumulative assessment

- 4.7.9 The assessment of cumulative effects considers the potential for the Project to contribute to combined effects on environmental and social receptors, either through interactions among its own components (intra-project cumulative effects) or in combination with other existing or planned developments in the area (inter-project cumulative effects). Given the limited availability of information on co-located or planned developments, the assessment will primarily focus on intra-project cumulative effects.
- 4.7.10 Each relevant ESIA topic will assess cumulative effects within its defined AoI, considering receptors that may be affected by multiple Project-related effects, e.g. noise, air quality, traffic, and community well-being. These components are particularly relevant within the framework of Kazakhstan's Sanitary Protection Zone (SPZ) regulations, which require the evaluation and management of such effects on surrounding land uses and sensitive receptors.
- 4.7.11 The assessment will follow the principles outlined in the IFC Good Practice Handbook on Cumulative Impact Assessment and Management, adapted to the scope and scale of this ESIA. Updated airport traffic forecasts through 2050 will be used to provide a forward-looking outlook for key impact areas, supporting the identification of long-term cumulative effects and informing appropriate mitigation planning.

## 4.8 Mitigation and enhancement measures

4.8.1 Where feasible the following hierarchy of mitigation measures will be applied:

- Avoid and reduce impacts and effects through design (embedded mitigation)
- Minimise impacts and effects at source or at receptor
- Repair, restore or reinstate to address temporary construction effects
- Compensate for loss or damage or residual impact

4.8.2 In addition to the above, community engagement and disclosure activities will play a key role in managing the extent of effects and consideration has also been given to the identification of enhancement measures. Enhancement measures are actions and processes that:

- Create new positive impacts and effects, or benefits
- Increase the reach or amount of positive impacts and effects, or benefits
- Distribute positive impacts and effects, or benefits, more equitably

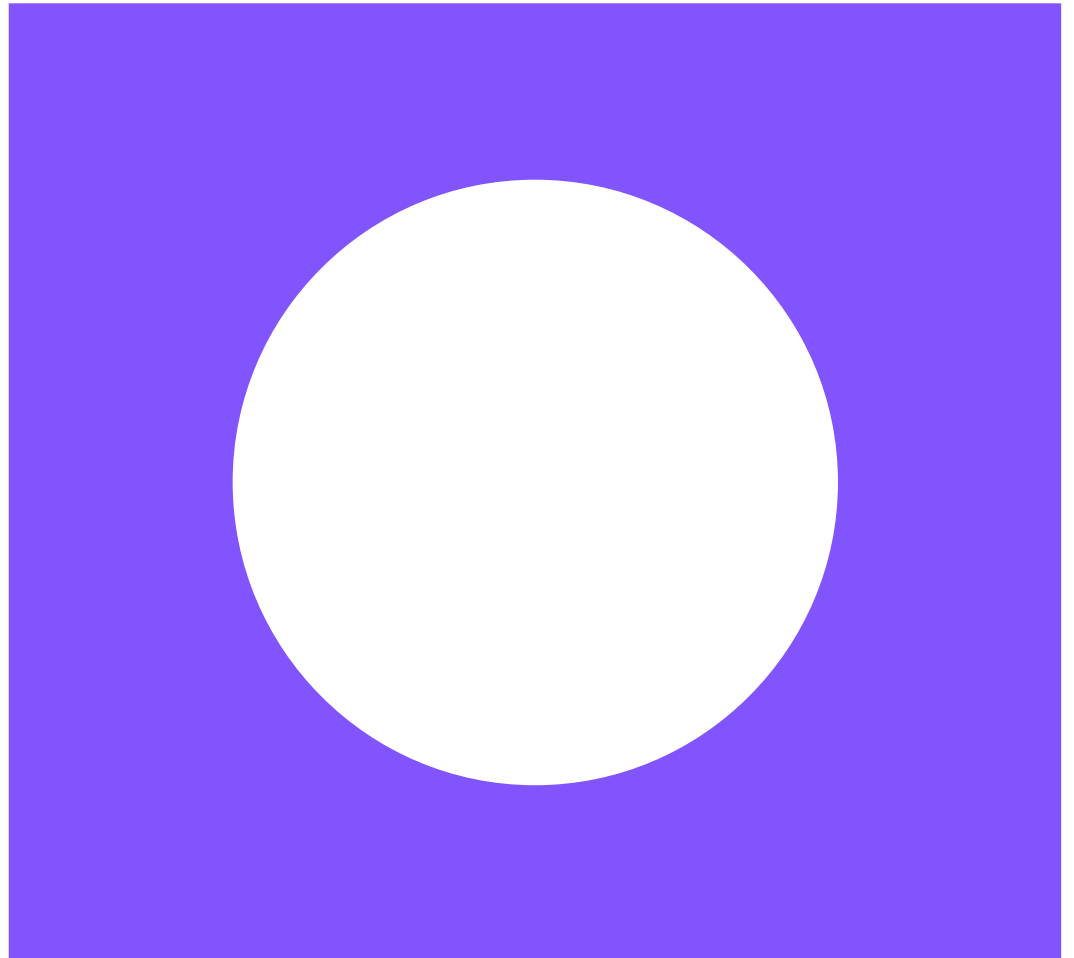
4.8.3 Each topic chapter will identify relevant mitigation and enhancement measures. All the mitigation, management and monitoring measures to address likely effects will be reported in the ESMP

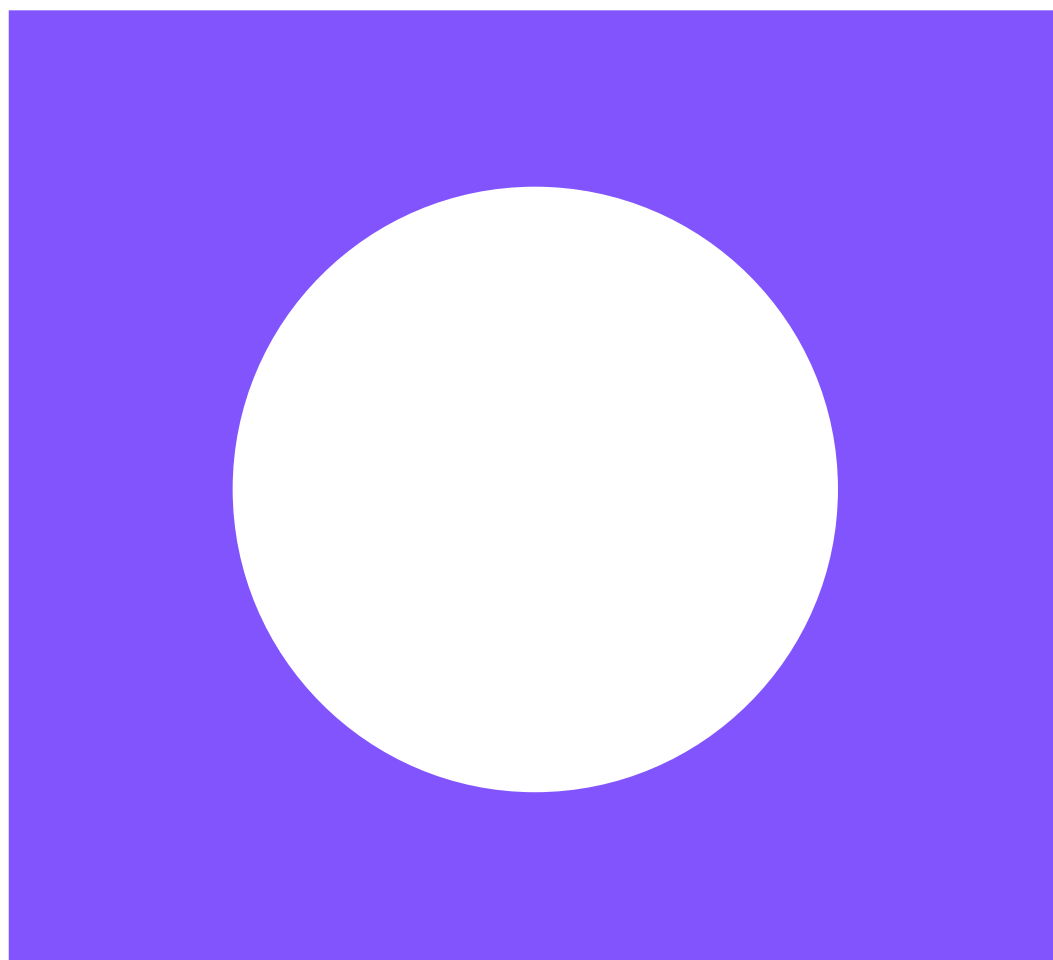
## 4.9 Residual effects

4.9.1 Residual effects are those that remain after the application of mitigation and enhancement measures. Impacts considered 'Major' or 'Moderate' after application of mitigation and enhancement measures, are presented as significant residual effects.

## 4.10 Uncertainty

4.10.1 Any uncertainties associated with impact prediction or the sensitivity of receptors due to the absence of data or other limitations will be explicitly stated. Where applicable, the ESIA will make recommendations concerning measures that should be put in place with monitoring or environmental or social management plans to deal with the uncertainty so that they may be addressed. Where a worst-case scenario is used, this will be clearly stated in the ESIA.





# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 5

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 5**

September 2025

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|          |            |            |         |          |                                            |
|          |            |            |         |          |                                            |

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# Contents

|                                                       |    |
|-------------------------------------------------------|----|
| Acronyms and abbreviations                            | 1  |
| 5 Air quality                                         | 2  |
| 5.1 Introduction                                      | 2  |
| 5.2 Methodology                                       | 2  |
| Applicable guidelines and standards                   | 2  |
| Area of Influence for air quality                     | 6  |
| Sensitive receptors                                   | 6  |
| Methodological approach                               | 6  |
| Limitations and assumptions                           | 15 |
| 5.3 Baseline                                          | 16 |
| Current baseline                                      | 16 |
| Future baseline                                       | 21 |
| 5.4 Potential impacts                                 | 22 |
| 5.5 Assessment of effects                             | 22 |
| Construction phase effects                            | 22 |
| Operational phase effects                             | 23 |
| Operational impacts and effects – occupational health | 27 |
| 5.6 Mitigation                                        | 28 |
| 5.7 Summary of residual effects                       | 28 |

## Tables

|                                                                                                                              |    |
|------------------------------------------------------------------------------------------------------------------------------|----|
| Table 5.1: Relevant ambient air quality standards for the protection ( $\mu\text{g}/\text{m}^3$ )                            | 5  |
| Table 5.2: Summary of relevant VOC ambient air quality standards for protection of human health ( $\mu\text{g}/\text{m}^3$ ) | 5  |
| Table 5.3: Relevant $\text{NO}_2$ occupational exposure standards                                                            | 5  |
| Table 5.4: Relevant VOC occupational exposure standards                                                                      | 6  |
| Table 5.5: Relevant dust generating activities                                                                               | 7  |
| Table 5.6: Receptor sensitivity classification                                                                               | 8  |
| Table 5.7: Assumed traffic data                                                                                              | 11 |
| Table 5.8: Summary of assumptions used in assessment                                                                         | 11 |
| Table 5.9: Determination of impact magnitude – construction phase                                                            | 14 |
| Table 5.10: Determination of receptor sensitivity – construction phase                                                       | 14 |
| Table 5.11: Determination of impact magnitude – operational phase                                                            | 15 |
| Table 5.12: Determination of receptor sensitivity – operational phase                                                        | 15 |
| Table 5.13: Monitored $\text{NO}_2$ , $\text{PM}_{10}$ and $\text{PM}_{2.5}$ at Stations No.4 and No.28                      | 16 |
| Table 5.14: Monitored $\text{NO}_2$ concentrations ( $\mu\text{g}/\text{m}^3$ ) (dates are all in 2021)                      | 19 |
| Table 5.15: Monitored VOC concentrations ( $\mu\text{g}/\text{m}^3$ )                                                        | 20 |

|                                                                                                                          |    |
|--------------------------------------------------------------------------------------------------------------------------|----|
| Table 5.16: Monitored PM <sub>10</sub> concentrations (µg/m <sup>3</sup> )                                               | 20 |
| Table 5.17: Monitored NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> and VOC concentrations (µg/m <sup>3</sup> ) | 21 |
| Table 5.18: Construction activities and associated impact magnitude                                                      | 22 |
| Table 5.19: Predicted NO <sub>2</sub> annual mean pollutant concentrations (µg/m <sup>3</sup> )                          | 25 |
| Table 5.20: Predicted PM <sub>10</sub> annual mean pollutant concentrations (µg/m <sup>3</sup> )                         | 25 |
| Table 5.21: Predicted PM <sub>2.5</sub> annual mean pollutant concentrations (µg/m <sup>3</sup> )                        | 25 |
| Table 5.22: Projected NO <sub>2</sub> emissions from LTOs and GSE (tonnes per year)                                      | 27 |
| Table 5.23: Summary of residual effects for air quality                                                                  | 29 |

## Figures

|                                                                                |    |
|--------------------------------------------------------------------------------|----|
| Figure 5.1: Construction dust receptors within 500m of construction activities | 9  |
| Figure 5.2: Air quality monitoring locations                                   | 18 |

# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                                                                    |
|------------------------|-----------------------------------------------------------------------------------------------|
| ALA                    | Almaty International Airport                                                                  |
| APUs                   | Auxiliary power units                                                                         |
| ATMs                   | Air traffic movements                                                                         |
| BTEX                   | Benzene, Toluene, Ethylbenzene and Xylene                                                     |
| CEMP                   | Construction Environmental Management Plan                                                    |
| COPERT                 | Computer Programme to calculate Emissions from Road Transport                                 |
| Defra                  | Department for Environment Food and Rural Affairs                                             |
| EBRD                   | European Bank for Reconstruction and Development                                              |
| EHS                    | Environmental Health and Safety                                                               |
| ESAP                   | Environmental and Social Action Plan                                                          |
| ESIA                   | Environmental and Social Impact Assessment                                                    |
| ESMP                   | Environmental and Social Management Plan                                                      |
| ESR                    | Environmental and Social Requirement                                                          |
| GIIP                   | Good International Industry Practice                                                          |
| GSE                    | Ground Support Equipment                                                                      |
| HDV                    | Heavy Duty Vehicle                                                                            |
| ICAO                   | International Civil Aviation Organisation                                                     |
| IFC                    | International Finance Corporation                                                             |
| Kazhydromet            | Kazakhstan Hydromet department                                                                |
| LDAR                   | Leak detection and repair                                                                     |
| LTO                    | Landing and take-off                                                                          |
| MAC                    | Maximum Allowable Concentration                                                               |
| MACda                  | Maximum Allowable Concentration daily average                                                 |
| MACmso                 | Maximum Allowable Concentration, or maximum single occurrence                                 |
| MACwz                  | Maximum Allowable Concentration for working zone                                              |
| MPE                    | Maximum Permissible Emission                                                                  |
| µg/m <sup>3</sup>      | Micrograms per cubic meter                                                                    |
| NIOSH                  | National Institute for Occupational safety and Health                                         |
| NO <sub>2</sub>        | Nitrogen dioxide                                                                              |
| OSHA                   | Occupational Safety and Health Administration                                                 |
| PEL                    | Permissible Exposure Limits                                                                   |
| PM <sub>10</sub>       | Particulate matter with an aerodynamic diameter of less than 10 microns (PM <sub>10</sub> )   |
| PM <sub>2.5</sub>      | Particulate matter with an aerodynamic diameter of less than 2.5 microns (PM <sub>2.5</sub> ) |
| REL                    | Recommended Exposure Limit                                                                    |
| SPZ                    | Sanitary Protection Zone                                                                      |
| TAV                    | TAV Airports Holding Co.                                                                      |
| VOC                    | Volatile Organic Compound                                                                     |
| WHO                    | World Health Organisation                                                                     |

## 5 Air quality

### 5.1 Introduction

- 5.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) reports the findings of the air quality assessment for the Project. It describes the existing baseline conditions within the study area and evaluates the potential for significant environmental effects on air quality resulting from Project activities.
- 5.1.2 The assessment considers the magnitude of predicted emissions and the sensitivity of identified receptors. Where relevant, mitigation measures have been proposed to manage and minimise potential impacts, in accordance with national air quality standards and international best practice.
- 5.1.3 This chapter includes reference to the ESIA for the Almaty Airport Expansion undertaken in 2022 and makes use of the baseline monitoring undertaken at that time. Further information on the 2022 ESIA can be found in **ESIA Chapter 1: Introduction**.

### 5.2 Methodology

#### Applicable guidelines and standards

- 5.2.1 The assessment has been undertaken considering relevant legislation, standards, and guidance as summarised in the sections below.

#### National requirements

- 5.2.2 Within the Republic of Kazakhstan there are regulations which establish standards for ambient and working zones<sup>1</sup>, including the following main documents:
- Environmental Code of Kazakhstan (2021 Amendment)<sup>2</sup>. This is the primary legal document governing environmental protection, including air quality. It introduced updated methodologies for emissions inventories and pollutant thresholds.
  - RD 52.04.667-2005 “Documents on the State of Atmospheric Pollution in Cities for Informing Government Agencies, the Public, and the Population. General Requirements for Development, Structure, Presentation, and Content”.
  - ҚР ДСМ-70 on the Approval of Sanitary Rules ‘Sanitary and Epidemiological Requirements for Sanitary Protection Zones of Facilities Affecting the Environment and Human Health’, dated 11 January 2022.
- 5.2.3 The key types of norms used for the regulation of impact on air quality are described below:
- Maximum Allowable Concentration (MAC) – a concentration below which does not have a long lasting direct or indirect adverse impact on the present or future generations and that

---

<sup>1</sup> Ambient zones refer to outdoor environments whilst working zones refer to occupational environments.

<sup>2</sup> European Union (2021) Code of the Republic of Kazakhstan. Available at: [https://wecoop.eu/wp-content/uploads/2021/04/2021-KZ-ENV-Code\\_full-text\\_en.pdf](https://wecoop.eu/wp-content/uploads/2021/04/2021-KZ-ENV-Code_full-text_en.pdf). Last accessed on 28/07/2025

does not affect human performance or have a negative impact on human health and/or sanitary conditions.

- Maximum Permissible Emission (MPE) – emission limit set for each stationary source of air pollution to prevent harmful emissions from the source creating surface concentrations exceeding MACs when taking into account cumulative impacts from other pollution sources of a city or town and from the prospective sources coming from the development of industries.
- Maximum Allowable Concentration for working zone (MACwz) - the concentration of harmful substances in the air during working hours (except holidays) for not less than 8 hours a week or more than 40 hours a week.
- Maximum Allowable Concentration, or maximum single occurrence (MACmso) - the concentration of harmful substances in the air of populated areas, which after 20 minutes does not cause reflex (or sub sensorial) reactions in human health.
- Maximum Allowable Concentration daily average (MACda) - the concentration of harmful substances in populated areas. The levels of pollutants should not influence human health directly or indirectly after inhaling them for an unlimited period of time (years). Thus, MACda is calculated for all groups in a population, and for an indefinitely long averaging period. They apply to all populated areas and are consequently considered the strictest of the Republic of Kazakhstan standards for air quality.

5.2.4 A summary of relevant national ambient air quality standards is presented in Table 5.1.

## International requirements

### International Finance Corporation (IFC) Requirements

5.2.5 The IFC provide a portfolio of Standards and Guidelines that should be adhered to for any project seeking IFC finance. The IFC Performance Standard 3: Resource Efficiency and Pollution Prevention<sup>3</sup> aims:

*“To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities”*

5.2.6 To achieve this, the IFC provides both industry-specific and general guidance on Good International Industry Practice with respect to ambient air quality and emissions to air. The Project will need to comply with the IFC Performance Standards, and the standards set out in the IFC Environmental Health and Safety (EHS) General Guidelines Air Emissions and Ambient Air Quality<sup>4</sup> and the IFC EHS Guidelines for Airports 2007<sup>5</sup>.

5.2.7 The IFC General EHS Guidelines advise that ‘relevant standards’ with respect to ambient air quality are national legislated standards or, in their absence, the current World Health Organisation (WHO) Air Quality Guidelines or other internationally recognised sources. As the Republic of Kazakhstan has its own nationally legislated standards, as described above, these legislated standards have been used to determine significance of potential ambient impacts.

5.2.8 Table 5.1 also presents the nationally legislated ambient air quality standards along with the European Union (EU) ambient air quality standards applicable from 1 January 2030<sup>6</sup>.

<sup>3</sup> International Finance Corporation (2012). IFC Performance Standard 3: Resource Efficiency and Pollution Prevention

<sup>4</sup> International Finance Corporation, World Bank Group, General Environmental Health and Safety Guidelines Air Emissions and Ambient Air Quality (2007)

<sup>5</sup> International Finance Corporation, World Bank Group, Environmental Health and Safety Guidelines for Airports (2007)

<sup>6</sup> European Union, Directive 2024/2881 of the European Parliament and of the council of 23 October 2024

- 5.2.9 The General EHS Guidelines specifically refer to the EU Directives as being an ‘internationally recognised source’ of ambient air quality standards. The EU legislation introduces a threshold of tolerance to account for exceptional, worst-case episodes. This translates as a limit not to be exceeded more than a certain number of times and can be expressed as a ‘percentile’.
- 5.2.10 The IFC General EHS Guidelines suggest that, as a general rule, emissions should not contribute more than 25 percent of the relevant air quality standards to allow additional, future sustainable development in the same airshed. Therefore, the significance of the impact of the Project has been discussed in the context of this approach.
- 5.2.11 The IFC also requires occupational health and safety to be assessed against appropriate standards. This assessment has used occupational health and safety standards prepared by the UK’s Health and Safety Executive for a comparison against national standards.

#### **European Bank for Reconstruction and Development (EBRD) Requirements**

- 5.2.12 The Project has been assessed against the guidance provided by the EBRD Environmental and Social Policy (Environmental and Social Requirement) (ESR) ESR3: Resource Efficiency and Pollution Prevention and Control<sup>7</sup>, the objectives of which are:

*“adopt the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource use and pollution released from the project”*

- 5.2.13 ESR3 refers to EU substantive environmental standards<sup>8</sup> and requires projects to be structured so that these can be applied at the project level.

*“When host country regulations differ from the levels and measures presented in EU substantive environmental standards or other appropriate environmental standards identified, projects will be required to meet whichever is more stringent.”*

- 5.2.14 ESR3 also states “The client will structure the project to meet relevant EU substantive environmental standards, where these can be applied at the project level”. It further clarifies how this should be implemented and confirms “For the purpose of this ESR, EU substantive environmental standards can be applied at the project level where the EU secondary legislative document itself contains clear quantitative or qualitative requirements that are applicable at the project level (as opposed to, for example, the ambient level).” Therefore, emissions that can be controlled at the project level must target the more stringent of the national or international standard, whereas relevant ambient air quality standards are those that are nationally legislated, with international air quality standards being applicable in the absence of national ambient air quality standards.

- 5.2.15 On this basis, the national ambient air quality standards are the primary standards applicable to the Project, with international air quality standards being applicable in the absence of national ambient air quality standards.

#### **Summary**

- 5.2.16 Table 5.1 presents the ambient air quality standards relevant to the emissions sources for the protection of human health for nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) which are relevant to the Project and are hereafter referred to as the ‘standards’, adopted for this assessment.

<sup>7</sup> European Bank for Reconstruction and Development (2024). Environmental and Social Policy

<sup>8</sup> Substantive environmental standards of the EU are comprised in EU secondary legislation, e.g., regulations, and directives. Procedural norms directed at Member States and EU institutions and the jurisprudence of the European Court of Justice and the Court of First Instance which applies to Member States, EU institutions and EU legal and natural persons, are excluded from this definition.



- 5.2.17 Table 5.2 presents relevant Volatile Organic Compound (VOC) limits recommended by the IFC, based on internationally recognised sources, and the Republic of Kazakhstan. Monitored VOC concentrations from the baseline surveys undertaken for the Project will be compared against these standards for the protection of human health.

**Table 5.1: Relevant ambient air quality standards for the protection ( $\mu\text{g}/\text{m}^3$ )**

| Pollutant                                | Averaging period | European Union standards <sup>(a)</sup> | Republic of Kazakhstan standards |
|------------------------------------------|------------------|-----------------------------------------|----------------------------------|
| Nitrogen dioxide ( $\text{NO}_2$ )       | 20 minutes       | -                                       | 200                              |
|                                          | 1 hour           | 200 <sup>(b)</sup>                      | -                                |
|                                          | 24 hour          | 50 <sup>(c)</sup>                       | 40                               |
|                                          | Annual           | 20                                      | -                                |
| Particulate matter ( $\text{PM}_{10}$ )  | 20 minutes       | -                                       | 300                              |
|                                          | 24 hour          | 45 <sup>(c)</sup>                       | 60                               |
|                                          | Annual           | 20                                      | -                                |
| Particulate matter ( $\text{PM}_{2.5}$ ) | 20 minutes       | -                                       | 160                              |
|                                          | 24 hour          | 25 <sup>(c)</sup>                       | 35                               |
|                                          | Annual           | 10                                      | -                                |

Notes: (a) to be attained by 1 January 2030; (b) 99.97th percentile (c) 95.07th percentile

**Table 5.2: Summary of relevant VOC ambient air quality standards for protection of human health ( $\mu\text{g}/\text{m}^3$ )**

| Pollutant        | Applicable international standards | Kazakhstan Maximum Allowable Concentrations (MAC) |         |
|------------------|------------------------------------|---------------------------------------------------|---------|
|                  | Annual                             | 20 minute                                         | 24 hour |
| Benzene (a)      | 3.4                                | 300                                               | 100     |
| Toluene (b)      | 1,910                              | 600                                               | -       |
| Ethylbenzene (b) | 4,410                              | 20                                                | -       |
| Xylene (b)       | 4,410                              | 200                                               | -       |

Source: (a) EU Limit values (b) Derived from Health and Safety Executive EH40/2001 occupational limits for 2001

- 5.2.18 Occupational standards are available from the Republic of Kazakhstan and from a variety of international sources including The National Institute for Occupational Safety and Health (NIOSH) and the UK Health and Safety Executive. The NIOSH provides occupational exposure limits for  $\text{NO}_2$ . Occupational exposure to  $\text{NO}_2$  is compared against two averaging periods which include Recommended Exposure Limit (REL) for a 15-minute time weighted average and an 8-hour time weighted Permissible Exposure Limits (PEL) as suggested by the Occupational Safety and Health Administration (OSHA).
- 5.2.19 Table 5.3 presents the appropriate  $\text{NO}_2$  occupational standards used as the basis for this assessment.

**Table 5.3: Relevant  $\text{NO}_2$  occupational exposure standards**

| Occupational standards   | Concentrations ( $\mu\text{g}/\text{m}^3$ ) |
|--------------------------|---------------------------------------------|
| 15-minute NIOSH REL      | 1,800                                       |
| 8-hour OSHA PEL          | 9,000                                       |
| 20-minute Kazakhstan MAC | 2,000                                       |

Source: <https://www.cdc.gov/niosh/>

REL - Recommended Exposure Limit; PEL - Permissible Exposure Limits

- 5.2.20 Relevant occupational exposure standards for VOCs applicable within the airport boundary are presented in Table 5.4. These are based on 8-hour averaging periods and have been used as an indication of potential risk to onsite workers.

**Table 5.4: Relevant VOC occupational exposure standards**

| Pollutant    | International standards |                   | Kazakhstan Maximum Allowable Concentrations |
|--------------|-------------------------|-------------------|---------------------------------------------|
|              | ppm                     | mg/m <sup>3</sup> |                                             |
| Benzene      | 1                       | 3.25              | 5                                           |
| Toluene      | 50                      | 191               | 50                                          |
| Ethylbenzene | 100                     | 441               | 50                                          |
| Xylene       | 50                      | 220               | 50                                          |

Source: UK Health and Safety Executive EH40/2005,

Notes: ppm – parts per million, based on 8-hour averaging period

### Area of Influence for air quality

- 5.2.21 The area of influence with regards to air quality is the area that could potentially be affected by emissions to air during the construction and operational phases.
- 5.2.22 During construction this is confined to a small area located around the construction site and the main transport routes. Construction effects are temporary and are located within 500m of the construction activity.
- 5.2.23 The operational phase effects would be experienced throughout the life of the Project and will be located within 200m of the access roads and approximately 1km from the airfield for airside activities.

### Sensitive receptors

- 5.2.24 Sensitive receptors with regards to air quality are members of the public, people at work or sensitive business or activities that could be affected by dust or changes in pollutant concentrations.
- 5.2.25 The sensitivity of receptors depends on the type and location in relation to the specific phase, i.e. construction or operation.
- 5.2.26 Key receptors related to the construction and operation phases are described below under the methodology for the air quality impact assessment.

### Methodological approach

- 5.2.27 This section of the chapter presents the methodology applied to the assessment of impacts.

### Construction phase methodology

#### Public Health

- 5.2.28 Construction activities can result in temporary effects from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75 microns. The nature of the area and activities to be carried out means that emissions of construction dust are predominantly associated with the movement and handling of subsoil minerals and composed of the larger fractions of this range which do not penetrate far into the respiratory system. Therefore, the primary air quality issue associated with the construction phase is typically the loss of amenity

and/or nuisance caused by dust emissions, such as the soiling of buildings and vegetation, or reduced visibility.

- 5.2.29 Dust deposition can be expressed in terms of mass per unit area per unit time, e.g.  $\text{mg/m}^2/\text{month}$ . No relevant Kazakhstan, IFC or EBRD standards exist for dust deposition; however, a range of criteria from 133 to  $350 \text{ mg/m}^2/\text{month}$  is found around the world as representative of thresholds for significant nuisance.
- 5.2.30 It is considered that a quantitative approach is inappropriate and unnecessary for assessing particulate emissions associated with the construction phase of the Project. The activities undertaken during the construction phase are likely to increase dust emissions in the area. However, on the basis that construction activities can be easily mitigated, a qualitative assessment of dust effects to inform the level of mitigation and subsequent likely impact is appropriate.
- 5.2.31 The first stage of the assessment has involved the identification of construction activities which have the potential to cause dust emissions, and the degree of that potential. Table 5.5 provides a list of potential construction activities. Selected information from this table has been used within this assessment to determine the impact of the Project with respect to construction dust.

**Table 5.5: Relevant dust generating activities**

| Potential dust emitting activities                       | Description                                                                                                                                                       | Dust emission potential |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Demolition                                               | Potential to be high given that the main runway and existing in-flight catering facility are made of concrete which is a potentially dusty construction material. | High                    |
| Groundworks and foundations                              | Potential to be high, depends on time of year and soil dryness                                                                                                    | High                    |
| Storage of materials onsite                              | Potential to be high, depends on time of year and material (e.g. soils and aggregate) dryness                                                                     | High                    |
| Transport of materials within site                       | Can be high depends on type of transport and nature of road surface                                                                                               | Medium                  |
| Transport of material offsite                            | Generally low as transport occurs by surfaced roads                                                                                                               | Low                     |
| Construction of new buildings and airport infrastructure | Generally low although some activities with high dust raising such as material cuttings and concrete batching can occur                                           | High                    |

- 5.2.32 In the second stage of the assessment, all sensitive receptors with the potential to be significantly affected by construction dust emissions have been identified. The distances from source at which construction dust effects are felt are dependent on the extent and nature of mitigation measures, prevailing wind conditions, rainfall and the presence of natural screening by, for example, vegetation or existing physical screening such as boundary walls on a site. Effects from construction activities that generate dust are generally limited to within 150-200m of the activity, however, to undertake a conservative assessment, receptors within 500m have been considered.
- 5.2.33 Table 5.6 presents key examples of sensitive receptors located within 50m of the construction boundary. While some receptors, such as the airside apron and taxiways, extend beyond this distance, they are only listed in the closest relevant band to avoid duplication. The table is not intended to be exhaustive but highlights representative receptor types and their sensitivity classifications for the purposes of the dust impact assessment.

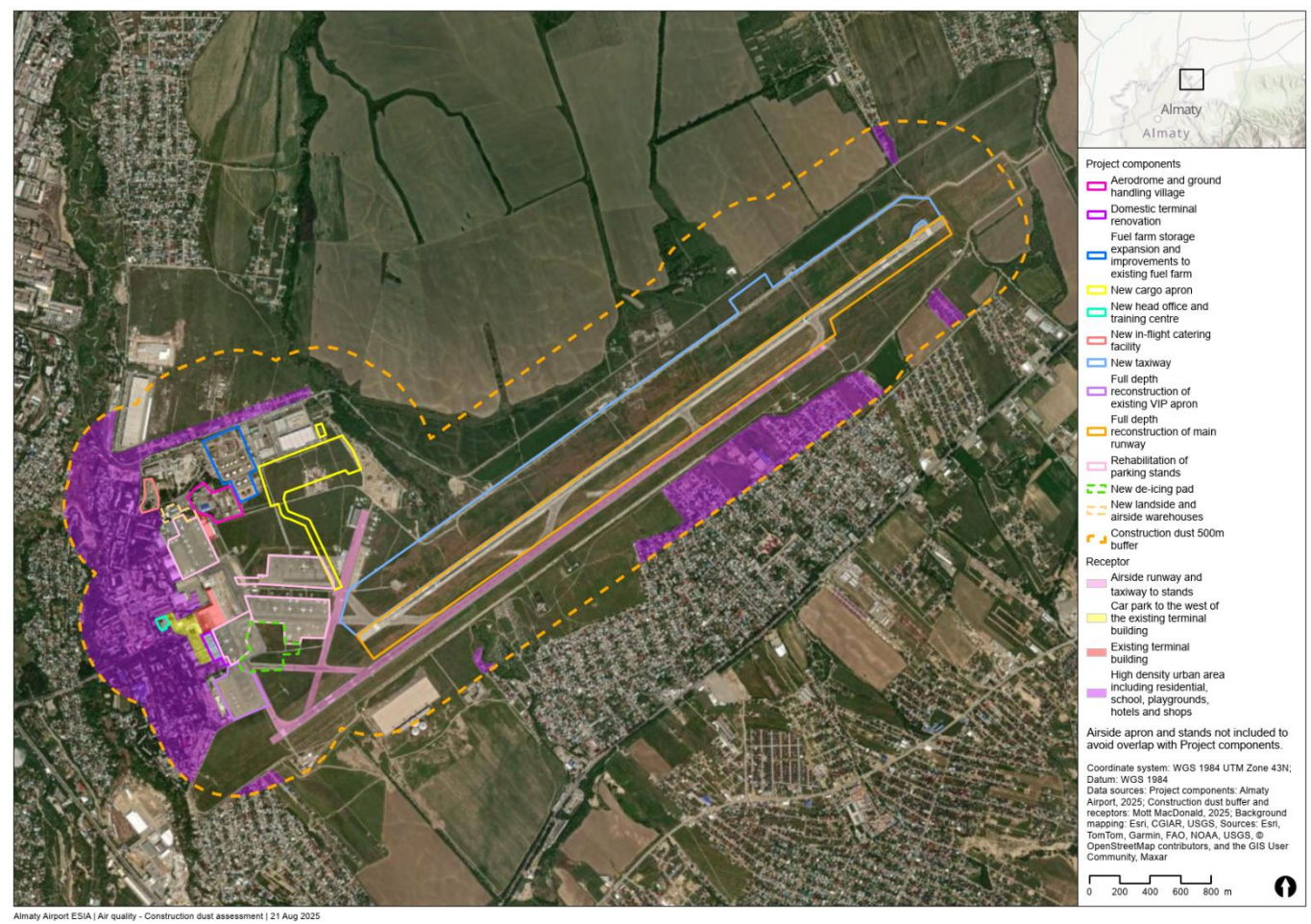
5.2.34 See Figure 5.1 below for construction dust receptors within 500m of construction activities.

**Table 5.6: Receptor sensitivity classification**

| Distance from source | Receptor type and sensitivity                                                                                                                                |                                                                      |                                               |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------|
|                      | High                                                                                                                                                         | Medium                                                               | Low                                           |
| Within 50m           | Existing airside apron, aircraft stands, taxiway and runway 05R-23L.<br>High density urban area including residential, school, playgrounds, hotels and shops | Car park to the west of the VIP apron.<br>Existing terminal building | Vegetation on the airfield and in urban areas |

Note: As detailed in paragraph 5.2.33, while some receptors listed in the table above extend up to 500m, which is the study area distance, they are only listed in the closest relevant band (i.e. within 50m) to avoid duplication.

Figure 5.1: Construction dust receptors within 500m of construction activities



- 5.2.35 At this stage, the exact number of vehicle movements required during the construction phase is not known. Guidance from the UK advises that significant effects are unlikely to occur where there are less than 200 Heavy Duty Vehicle (HDV)<sup>9</sup> movements per day as an annual average for a period. Where construction activities are less than two years it is unlikely that the construction activities would constitute a significant air quality effect given the short-term duration of the construction activities as opposed to the long-term operation of the Project<sup>10</sup>. It has been assumed that construction HDV movements will be lower than this and are anticipated to utilise Mailin Street as the primary access to the airport, avoiding residential streets where possible.
- 5.2.36 Therefore, it is considered highly unlikely that significant effects would arise from construction phase vehicle movements and they have not been considered further. However, general mitigation measures to help reduce emissions have been provided in Table 5.23.
- 5.2.37 In addition, emissions from on-site construction plant are not expected to be significant and have not been assessed further due to the distance from sensitive receptors and the limited construction period; nevertheless, best practice mitigation measures have been included in Table 5.23 to minimise these impacts.

#### **Occupational Health**

- 5.2.38 Dust generated during the construction phase is not expected to cause an occupational exposure risk following standard dust suppression mitigation and has not been considered further. Mitigation measures to minimise emissions from onsite combustion plant have been presented in Table 5.23.

### **Operational phase methodology – public health**

#### **Operational phase traffic**

- 5.2.39 The completion of the Project will improve the airport's capacity in line with projected passenger and cargo traffic growth and will contribute to the airport being able to handle additional passenger numbers. Whilst it is expected that a proportion of these will be 'in-transit' passengers as the airport aims to increase its 'hub' activities, there will be increased journeys to and from the airport from other passengers. Currently there is no onsite rail link to the airport and therefore these additional journeys will likely be made by car or bus.
- 5.2.40 Mailin Street has been considered within the assessment of operational traffic as this is likely to represent the road with the largest impacts from additional traffic from the Project. Increases in operational traffic on other roads, such as Zakarpatskaya Street, will be lower than those on Mailin Street and therefore air quality impacts will also be lower.
- 5.2.41 Considering the limited information on detailed traffic information for existing and future traffic flows, existing traffic flows along Mailin Street were estimated from a three-day traffic survey undertaken in 2021 at locations in close proximity to where ambient air quality monitoring has been undertaken. This has been used to estimate the proportion of traffic on Mailin Street that is associated with the airport and the proportion which is local road traffic by using data from the airport vehicle entrance and exit barriers. This survey indicated that approximately 60 percent of traffic on Mailin Street was local traffic and the remaining 40 percent was associated with the airport.

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<sup>9</sup> An HDV is any vehicle with a gross weight greater than 3.5 tonnes. This includes heavy goods vehicles (i.e. those used to transport goods) but can also include other large vehicles that may be used during construction such as waste collection, mobile road-going cranes and other specialist equipment.

<sup>10</sup> National Highways (2024). Design Manual for Roads and Bridges Sustainability & Environment Appraisal LA 105 Air Quality

5.2.42 Many of the assumptions used to inform the assessment of road traffic impacts are based on predicted future usage of the airport. These predictions are based on best estimates at present and could change in future years. Nevertheless, to address this uncertainty and to undertake a conservative assessment, future road traffic at the airport has been estimated based on anticipated demand and growth at the airport. These estimates do not account for whether the infrastructure can accommodate such increases. In addition, traffic flows for the future year of 2030 without the Project in place are not available. As such, future baseline traffic flows have been assumed to be equal to base year traffic flows for 2021. As this does not account for non-Project related growth in traffic numbers between these years, the difference between the future year traffic flows without and with the Project is likely to be overestimated, therefore increasing the predicted change in pollutant concentrations which represents a conservative assessment.

5.2.43 Table 5.7 presents the traffic data used in the assessment.

**Table 5.7: Assumed traffic data**

| Road          | 2021 flows (total) | % HDV | 2030 without Project | %HDV | 2030 with Project | %HDV |
|---------------|--------------------|-------|----------------------|------|-------------------|------|
| Mailin Street | 44,500             | 3.3   | 44,500               | 3.3  | 52,000            | 3.3  |

Note: % HDV means percentage of total traffic flows that are heavy duty vehicles

5.2.44 To predict the increase in pollutant concentrations as a result of increased traffic, an assessment has been undertaken using the dispersion co-efficient equations presented within the National Highway's Design Manual for Roads and Bridges screening model. The screening model is designed to be conservative, meaning it is more likely to overestimate rather than underestimate pollutant concentrations. Emission factors are based on the European Environment Agency's Computer Programme to calculate Emissions from Road Transport (COPERT) emission calculation tool and are considered suitable for use in Kazakhstan. The COPERT emissions have been processed using the UK's Department for Environment Food and Rural Affairs (Defra) Emission Factor Toolkit.

5.2.45 It is acknowledged that the existing vehicle fleet in Kazakhstan does not meet the most recent EURO emission standards. Therefore, emissions produced for the existing fleet composition takes account of the older fleet and more polluting vehicles which are currently present. Future year projections have also been manually adjusted to include a greater proportion of older more polluting vehicles and to undertake a conservative assessment.

5.2.46 Table 5.8 presents the approach and assumptions used in the assessment.

**Table 5.8: Summary of assumptions used in assessment**

| Parameter                                        | Assumption                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conversion of NO <sub>x</sub> to NO <sub>2</sub> | The assessment has assumed a 50% conversion rate of NO <sub>x</sub> to NO <sub>2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Background NO <sub>2</sub> concentrations        | The assessment has assumed a background concentration of NO <sub>2</sub> of 45µg/m <sup>3</sup> , measured at Almerek Village, for the base year of 2021 and is based on the monitoring data collected as part of the ESIA produced for the Almaty Airport Expansion in 2022 at locations away from emission sources. To determine future concentrations, no change in baseline concentrations has been assumed which is a conservative assumption as it would be expected to decline in future years as newer less polluting cars enter the fleet. |
| Speed                                            | The assessment has assumed the traffic is travelling at 40kph which is the speed limit of Mailin Street.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Pollutants considered                            | The assessment of impacts has considered NO <sub>x</sub> , NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> . Emissions of other pollutants, such as sulphur dioxide and                                                                                                                                                                                                                                                                                                                                                                    |

| Parameter              | Assumption                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        | VOCs, from road transport are de minimis relative to those listed here and have not been considered further.                                                                                                                                                                                                                                                                            |
| Euro class assumptions | In 2021 it has been assumed that cars, light goods vehicles and heavy good vehicles will have a 50/50 split between Euro 2/II and Euro 3/III emissions. In 2030, it has been assumed 25% of cars and light good vehicles will meet Euro 4 standards, 50% Euro 5 standards and 25% Euro 6 standards. 25% of HDVs have been assumed to meet Euro III standards and 75% Euro IV standards. |

## Onsite energy plant

- 5.2.47 There is no new onsite energy plant associated with the Project; electricity will be supplied from the Kazakhstan electricity grid and heating will be supplied by existing district heating supplies. On this basis, no further assessment of onsite energy plant has been undertaken.

## Fuel storage

- 5.2.48 As detailed in Section 2.5 of **ESIA Chapter 2: Project description**, fuel operations currently encompass reception, storage, accounting, quality control, fuel dispensing, and aircraft refuelling. In response to growing traffic and the recent construction of the new international terminal, which was part of the Almaty Airport Expansion assessed in the 2022 ESIA, it is proposed that additional fuel storage infrastructure is constructed, and the existing fuel farm is improved, which is located within the northern part of the airport boundary.
- 5.2.49 Airport fuel operations during the operational phase have the potential to impact air quality as a result of fugitive emissions associated with equipment such as leaking pipes, valves, connections, flanges and seals as well as general loading, unloading and storage operations. However, the upgrade of the existing fuel farm will modernise the equipment, incorporating the latest techniques and industry best practice. It is considered that Good International Industry Practice (GIIP) will be followed in the design stage and during maintenance of the Project to control and reduce fugitive emissions, and to select equipment that meets both safety, suitability and fugitive emission control requirements.
- 5.2.50 As fugitive emissions are controlled through design and maintenance, there is no potential for significant adverse effects from fugitive emissions during the operational phase and fugitive emissions have not been considered further. However, measures to monitor fugitive emissions of VOCs in accordance with GIIP are recommended in Table 5.23.

## Airside emissions

- 5.2.51 Impacts on air quality from airside emissions have considered:
- The projected increase in air traffic movements (ATMs) quantitatively
  - An increase in Ground Support Equipment (GSE) quantitatively
  - Increases in emissions from auxiliary power units (APUs) whilst aircraft are on a stand due to increased ATMs qualitatively
- 5.2.52 Emissions from the ATMs, specifically the landing and take-off (LTO) cycle, and GSEs have been considered quantitatively following the 'simple' approach set out in the International Civil Aviation Organisation (ICAO) Air Quality Manual<sup>11</sup>. The additional emissions from the ATMs and GSEs have been considered in the context of existing air quality. As with future road traffic data,

<sup>11</sup> ICAO (2015). Airport Air Quality Manual. CAEP10 Steering Group 2015 Approved Revision (Based on the First Edition – 2011).



future air traffic data has been based on projected demand and growth at the airport and does not account for whether the existing infrastructure can accommodate such increases.

- 5.2.53 NO<sub>x</sub>, particulate matter and VOCs are considered to be the primary pollutants associated with airside emissions and GSEs. However, impacts from airside operations have been considered using concentrations of NO<sub>x</sub> only. This is because emissions from other pollutants, such as particulates and sulphur dioxide, from the primary airfield sources, such as aircraft engines, are negligible relative to NO<sub>x</sub>. On the basis that fuel and other sources of VOCs are managed in accordance with GIIP, emissions of VOCs are also considered to be negligible.
- 5.2.54 NO<sub>x</sub> emissions from the likely increase in LTOs have been estimated by multiplying the number of LTO cycles for each aircraft class for 2025 (base year) and 2030 (future year)<sup>12</sup> respectively, with the corresponding NO<sub>x</sub> emission factor for the aircraft as specified in Table B-1 of the ICAO Air Quality Manual. Aircraft have been categorised into six groups (A-F), and within each group, the highest emission factor across the corresponding aircraft models (e.g. Airbus A300) within that group has been used for the calculations<sup>13</sup>. The values across all aircraft groups were then aggregated to calculate the total NO<sub>x</sub> emissions from LTOs. The approach assumes that the operational conditions are consistent with the ICAO data used, and does not consider variations in engine models, operational settings, or Time in Mode. Nevertheless, given the absence of detailed data on aircraft operational parameters, the ICAO simple methodology is considered suitable for the prediction of annual mass emissions from the LTO cycle.
- 5.2.55 GSE emissions have been calculated by multiplying the number of aircraft movements and ICAO NO<sub>x</sub> emission factors for GSE technology, which are presented in Table 3-A2-4 of the ICAO Air Quality Manual, together. The ICAO GSE emission factors are categorised by age and size of aircraft (narrow-body or wide-body) being supported and have been used in the absence of Project-specific emission factors for the GSE fleet. The average age of the GSE fleet at the airport is 10.7 years. However for the assessment, ICAO GSE emission factors for 1990-2005 have been used as a worst-case approach, given that older technology has higher emissions and the GSE contributions to the total airside emissions are relatively low compared to the ATMs. The GSE emissions associated with the different size of aircrafts (i.e. narrow-body or wide-body) were then aggregated to calculate the total NO<sub>x</sub> emissions from GSE.
- 5.2.56 The emissions from the LTOs and GSEs were combined to calculate the total emissions and the change in total emissions between the current and future was then calculated. The potential impact of the change in total emissions on nearby sensitive receptors was then assessed qualitatively.
- 5.2.57 In addition, as part of the Environmental and Social Action Plan (ESAP) produced for the Almaty Airport Expansion in 2022, the airport committed to reducing APU operation times by 50% to help reduce emissions, decreasing usage from 40 minutes to 20 minutes before take-off, and from 20 minutes to 10 minutes after landing. The '8<sup>th</sup> Site Visit Report'<sup>14</sup> prepared by SE Solutions (Pty) Ltd confirms that this target was successfully achieved during the eighth site visit that took place in Q1 2025. It is considered that these measures will control any additional emissions associated with the increased number of APUs. As such, significant adverse effects from APU emissions during the operational phase are unlikely and have not been considered further.

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<sup>12</sup> Given the assumptions relating to aircraft emissions and uncertainty relating to future technologies bringing reductions in emissions from aviation, it is not considered suitable to project mass emissions from individual projects in the aviation sector beyond the first future year as the likelihood of uncertainty and error increases.

<sup>13</sup> The aircraft models within each group are based on monitored 2024 flight data and has been assumed to be the same for 2025 and 2030.

<sup>14</sup> This is the eighth report in a series of reports that detail project compliance with the ESAP for the Almaty Airport Expansion in 2022

## Operational phase methodology – occupational health

5.2.58 Operational phase occupational risks have been assessed qualitatively considering existing pollutant concentrations and relevant occupational air quality standards.

## Determination of Significance

5.2.59 Determining the significance of effects identified is one of the main purposes of an environmental assessment and enables the identification of necessary mitigation measures. An environmental impact can be either beneficial or adverse and is assessed by comparing the quality of the existing environment with the predicted quality of the environment once a project is in place.

5.2.60 In order to describe the significance of an effect it is important to distinguish between two concepts: 'magnitude' and 'sensitivity'. The application of these concepts for this assessment is outlined in **ESIA Chapter 4: ESIA scope and methodology** and should be read in conjunction with this chapter. This section describes how the significance criteria for the operational phase has been derived based on an assessment of magnitude of the impact and receptor sensitivity.

### Construction Phase

5.2.61 A combination of dust emission potential from on-site activities and expected durations presented in Table 5.5 has been used to determine the impact magnitude of the construction phase. Table 5.9 sets out how the dust raising magnitude is determined using dust raising potential and duration.

**Table 5.9: Determination of impact magnitude – construction phase**

| Dust raising potential <sup>(a)</sup> | Duration  | Magnitude  |
|---------------------------------------|-----------|------------|
| High                                  | Any       | Major      |
| Medium                                | >3 months | Moderate   |
| Medium                                | <3 months | Minor      |
| Low                                   | Any       | Negligible |

Notes: <sup>(a)</sup> Dust raising potential defined in accordance with the approach described in Section 'Construction phase methodology'.

5.2.62 Receptor sensitivity has been determined based on the type of receptor and the distance from the construction boundary or activity that the receptor is located. Table 5.10 presents how the receptors classification and the distance the receptor is from construction activities has been used to determine sensitivity.

**Table 5.10: Determination of receptor sensitivity – construction phase**

| Receptor classification | Distance to activities |         |          |            |
|-------------------------|------------------------|---------|----------|------------|
|                         | 0-50m                  | 50-100m | 100-200m | 200-500m   |
| High                    | High                   | High    | Medium   | Low        |
| Medium                  | Medium                 | Medium  | Low      | Low        |
| Low                     | Medium                 | Low     | Low      | Negligible |

Notes: Receptors classified based on method described in Section 'Construction phase methodology'.

5.2.63 In summary, the magnitude of impacts is a product of the types of activities carried out and their durations. The receptor sensitivities are a product of the receptor type and their distance to the construction activities.

5.2.64 Following the determination of magnitude and sensitivity, the significance of impacts and therefore overall risk of dust effects from the construction phase has been evaluated based on the significance matrix presented in **ESIA Chapter 4: ESIA scope and methodology**.

## Operational Phase

- 5.2.65 The General EHS Guidelines classify 'poor quality airsheds' as those where relevant standards are exceeded significantly. Therefore, receptors experiencing baseline ambient pollutant concentrations above the relevant standards are concluded to be of 'high' sensitivity.
- 5.2.66 For each of the pollutants considered, different air quality standards are applicable. Table 5.11 presents the determination of impact magnitude and this is determined based on the change in pollutant concentrations compared to the relevant air quality standard that a project results in. Table 5.12 presents the determination of receptor sensitivity for the operational phase which is determined based on the existing baseline compared to the relevant ambient air quality standards.
- 5.2.67 Following the determination of magnitude and sensitivity, the significance of effects from the operational phase has been evaluated based on the significance matrix presented in **ESIA Chapter 4: ESIA scope and methodology**.

**Table 5.11: Determination of impact magnitude – operational phase**

| Change in concentrations as % of standards | Magnitude  |
|--------------------------------------------|------------|
| Increase >25%                              | Major      |
| Increase 15-25%                            | Moderate   |
| Increase 5-15%                             | Minor      |
| Increase <5%                               | Negligible |

**Table 5.12: Determination of receptor sensitivity – operational phase**

| Baseline concentration as a percentage of relevant air quality standard | Magnitude  |
|-------------------------------------------------------------------------|------------|
| Increase >25%                                                           | High       |
| Increase 15-25%                                                         | Medium     |
| Increase 5-15%                                                          | Low        |
| Increase <5%                                                            | Negligible |

## Limitations and assumptions

- 5.2.68 The assessment of air quality impacts has been based on the most up to date and best information available at the time of assessment.
- 5.2.69 The assessment of operational road traffic has been based on assumptions as set out within the methodology in paragraphs 5.2.39 to 5.2.46. There is an inherent amount of uncertainty with the approach used, namely:
- Assumptions about baseline pollutant concentrations
  - Base traffic flows and projections used in the assessment
  - Assumptions associated with NO<sub>x</sub> to NO<sub>2</sub> conversions
  - Average speed of traffic flow
- 5.2.70 In order to reduce this uncertainty and provide an indication of the robustness of the assessment, base traffic data derived for 2021 for the assessment and the assumptions above have been used to predict concentrations for the location where NO<sub>2</sub> monitoring data has been collected on Mailin Street. The predicted results and the monitored data have been compared to determine if the various assumptions and approach is suitable.
- 5.2.71 The predicted roadside pollutant concentrations for 2021 were broadly in line with monitored concentrations (as shown in Table 5.19 and Table 5.14 where the predicted and monitored

pollutant concentration is  $78.4\mu\text{g}/\text{m}^3$  and  $80\mu\text{g}/\text{m}^3$  respectively on Mailin Street) and indicated that the assumptions used within the assessment are appropriate. Therefore the approach is appropriate to provide an indication of the level of impact the Project would contribute to in future years.

- 5.2.72 Furthermore, the assessment of operational air traffic has been based on the following assumptions, in addition to those detailed in paragraphs 5.2.52 and 5.2.55:
- Aircraft emission factors are only publicly available for a limited number of aircraft type, therefore assumptions regarding aircraft type have been made to fill data gaps.
  - It is assumed that there is no reduction in aircraft and GSE emission factors associated with replacement of fleet and improvements in technology in the future. This conservative assumption leads to a cautious and likely overestimate of airside emissions.
- 5.2.73 Airside mass emission calculations cannot be used to determine changes in pollutant concentrations in the surrounding area; however, they can be used to give an indication of change and, in conjunction with existing available ambient air quality monitoring in and around the airport, a qualitative analysis of impact and likely significant effects has been undertaken.

## 5.3 Baseline

### Current baseline

#### Kazhydromet monitoring data

- 5.3.1 Ambient air quality monitoring is undertaken by the Kazakhstan Hydromet department (Kazhydromet) at multiple locations across Almaty. Data is publicly available for the preceding 24 hours and is forecast for the next 48 hours while historical data can be requested directly from the Hydromet department.
- 5.3.2 The closest station, No 28: Almaty, Aerological Station, Akhmetova Street, 50, is located approximately 800m to the north-west of the airport boundary and set back approximately 50m from the nearest main road. In addition, Station No 4: Almaty, Turksib district, comprehensive school No 32 is also located approximately 2.2km north-west of the airport. These monitors provide a good indication of air pollutant concentrations in the area surrounding the airport.
- 5.3.3 Figure 5.2 presents the locations of the monitoring stations. Historical data from these stations from the Kazhydromet between January 2022 and December 2024 have been provided and are presented in Table 5.13.
- 5.3.4 Monitored data indicates that  $\text{NO}_2$  concentrations are generally high at both stations and likely to exceed or be close to exceeding air quality standards for the national 20 minutes ( $200\mu\text{g}/\text{m}^3$ ) and 24-hour mean ( $40\mu\text{g}/\text{m}^3$ ), international 1-hour mean ( $200\mu\text{g}/\text{m}^3$ ) and annual mean ( $40\mu\text{g}/\text{m}^3$ ). However, the monitoring data indicates that  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  concentrations generally meet the national 20-minute 24-hour annual mean and international annual mean standards at both stations.

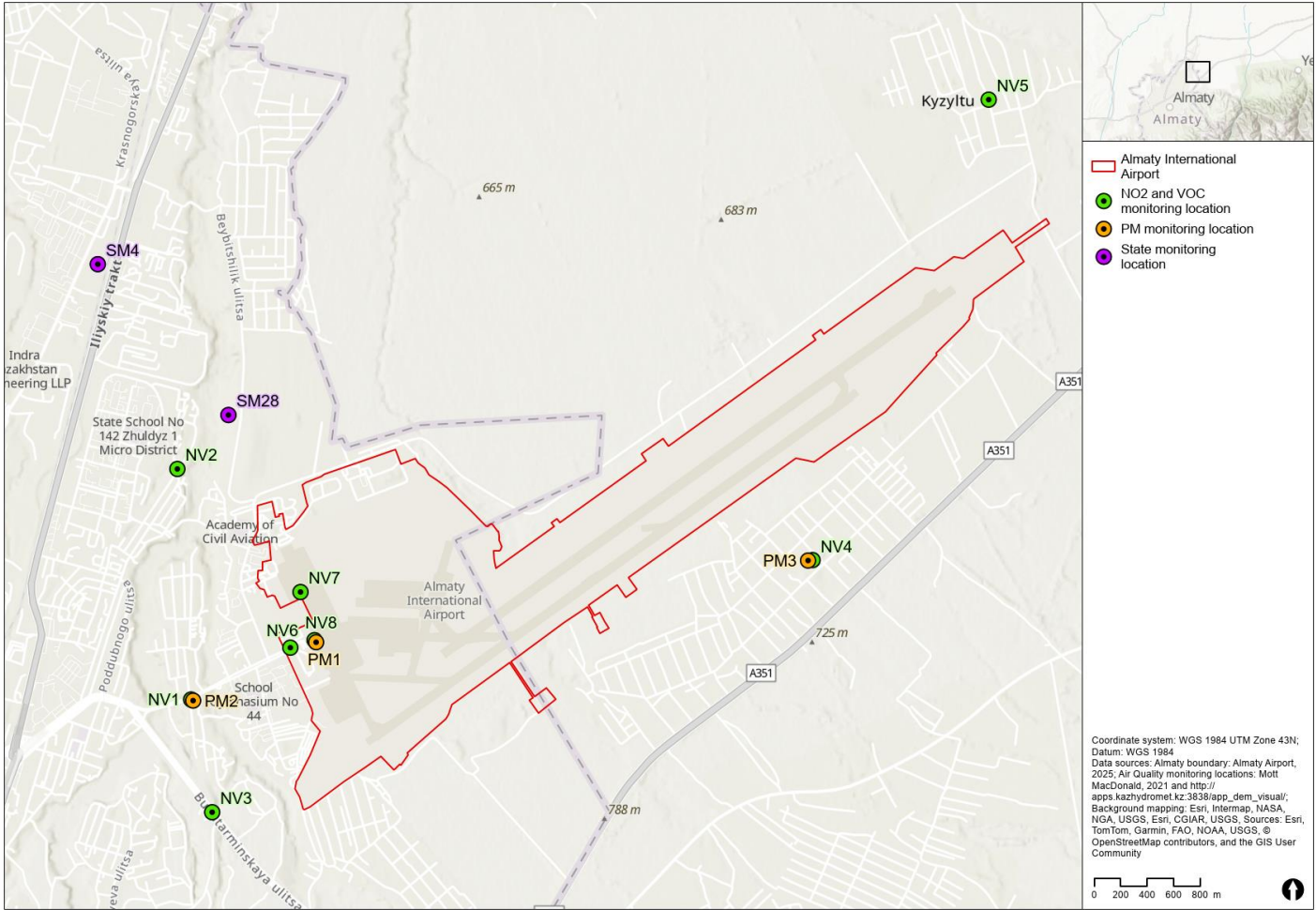
**Table 5.13: Monitored  $\text{NO}_2$ ,  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  at Stations No.4 and No.28**

| Site ID                                                                                                                                                     | Year |      |      |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------|
|                                                                                                                                                             | 2022 | 2023 | 2024 | Average |
| Maximum 20 minute NO <sub>2</sub> concentration (µg/m <sup>3</sup> ) – National standard 200µg/m <sup>3</sup>                                               |      |      |      |         |
| SM4                                                                                                                                                         | 125  | 196  | 588  | 303     |
| SM28                                                                                                                                                        | 192  | 211  | 317  | 240     |
| Maximum 1 hour mean NO <sub>2</sub> concentration (µg/m <sup>3</sup> ) – International standard only 200µg/m <sup>3</sup> at 99.97 <sup>th</sup> percentile |      |      |      |         |

| Site ID                                                                                                                | Year |      |      |         |
|------------------------------------------------------------------------------------------------------------------------|------|------|------|---------|
|                                                                                                                        | 2022 | 2023 | 2024 | Average |
| SM4                                                                                                                    | 114  | 173  | 532  | 273     |
| SM28                                                                                                                   | 173  | 200  | 209  | 194     |
| <b>Maximum 24 hour mean NO<sub>2</sub> concentration (µg/m<sup>3</sup>) – National standard 40µg/m<sup>3</sup></b>     |      |      |      |         |
| SM4                                                                                                                    | 55   | 78   | 294  | 143     |
| SM28                                                                                                                   | 89   | 104  | 86   | 93      |
| <b>Annual mean NO<sub>2</sub> concentrations (µg/m<sup>3</sup>) – International standard only 20µg/m<sup>3</sup></b>   |      |      |      |         |
| SM4                                                                                                                    | 30   | 21   | 35   | 29      |
| SM28                                                                                                                   | 37   | 47   | 36   | 40      |
| <b>Maximum 20 minute PM<sub>10</sub> concentration - National standard 300µg/m<sup>3</sup></b>                         |      |      |      |         |
| SM4                                                                                                                    | 3    | 36   | 2    | 14      |
| SM28                                                                                                                   | 231  | 54   | 235  | 174     |
| <b>Maximum 24 hour mean PM<sub>10</sub> concentration – National standard 60µg/m<sup>3</sup></b>                       |      |      |      |         |
| SM4                                                                                                                    | 2    | 13   | 1    | 5       |
| SM28                                                                                                                   | 78   | 4    | 69   | 50      |
| <b>Annual mean PM<sub>10</sub> concentrations (µg/m<sup>3</sup>) – International standard only 20µg/m<sup>3</sup></b>  |      |      |      |         |
| SM4                                                                                                                    | 1    | 5    | 1    | 2       |
| SM28                                                                                                                   | 31   | 1    | 34   | 22      |
| <b>Maximum 20 minute PM<sub>2.5</sub> concentrations (µg/m<sup>3</sup>) – National standard 160µg/m<sup>3</sup></b>    |      |      |      |         |
| SM4                                                                                                                    | 3    | 3    | 7    | 4       |
| SM28                                                                                                                   | 70   | 53   | 220  | 114     |
| <b>Maximum 24 hour mean PM<sub>2.5</sub> concentrations (µg/m<sup>3</sup>) – National standard 35µg/m<sup>3</sup></b>  |      |      |      |         |
| SM4                                                                                                                    | 2    | 1    | 1    | 2       |
| SM28                                                                                                                   | 25   | 4    | 49   | 26      |
| <b>Annual mean PM<sub>2.5</sub> concentrations (µg/m<sup>3</sup>) – International standard only 10µg/m<sup>3</sup></b> |      |      |      |         |
| SM4                                                                                                                    | 1    | 1    | 1    | 1       |
| SM28                                                                                                                   | 9    | 2    | 23   | 11      |

Note: 2022 data capture: 95.3% for NO<sub>2</sub> and 97% for PM<sub>10</sub> and PM<sub>2.5</sub>. 2023 data capture: 95% for NO<sub>2</sub> and 83.5% for PM<sub>10</sub> and PM<sub>2.5</sub>. 2024 data capture: 97.1% for NO<sub>2</sub>, 97.5% for PM<sub>10</sub>, 97.2% for PM<sub>2.5</sub>.

Figure 5.2: Air quality monitoring locations



Almaty Airport ESIA | Air quality - Air quality monitoring locations | 23 Jul 2025

## Airport Operation monitoring – 2020 to 2022

### Gaseous monitoring

- 5.3.5 Monitoring was undertaken between 2020 and 2022 for the 2022 ESIA and utilised passive monitoring equipment commonly referred to as diffusion tubes for NO<sub>2</sub>, Benzene, Toluene, Ethylbenzene and Xylene (BTEX). Diffusion tubes are passive samplers and rely on the physical movement of air through the tube (rather than air being drawn into the apparatus). The tubes contain a chemically active surface at one end coated on a small non-reactive metal grid. Once the active surface is exposed, a concentration gradient forms within the tube. The total concentration can be calculated based on this and the period that the tube has been exposed.
- 5.3.6 Diffusion tubes were located at eight sites, with BTEX and NO<sub>2</sub> monitoring being undertaken for three periods over a duration of six weeks<sup>15</sup> and nine weeks<sup>16</sup> respectively, both between January and March 2021. Locations of the monitoring sites used are presented in Figure 5.2. At each location, two tubes were deployed for NO<sub>2</sub> and the average concentrations of these two sites determined for each period of monitoring.
- 5.3.7 This monitoring was undertaken within the airport boundary, with three monitoring sites located within/adjacent to the Sanitary Protection Zone (SPZ), along the key access road and nearby villages, by specialists from EcoSocio Analysts LLC.
- 5.3.8 Table 5.14 presents the period mean of monitored pollutant concentrations for all of the monitoring locations for NO<sub>2</sub>. The monitored data indicates that the period mean was high and although diffusion tube monitoring provides a long-term average across the monitoring period, it can be assumed that the national 24-hour standard for NO<sub>2</sub> was being exceeded at all monitoring locations as the period mean was above 40µg/m<sup>3</sup>. The highest concentration was monitored along Mailin Street which is the main access route to and from the airport and is heavily influenced by road traffic. Concentrations in surrounding villages were lower than this, and lower than the concentrations monitored within the airport perimeter. However, concentrations in surrounding villages were still very high away from the main road and airport sources indicated that the high existing concentrations were driven by local sources such as heating for residential properties and meteorological conditions in winter months.

**Table 5.14: Monitored NO<sub>2</sub> concentrations (µg/m<sup>3</sup>) (dates are all in 2021)**

| Site ID | Location                        | Period 1 27 <sup>th</sup><br>January –<br>17 <sup>th</sup> February | Period 2 17 <sup>th</sup><br>February –<br>11 <sup>th</sup> March | Period 3 11 <sup>th</sup><br>March – 31 <sup>st</sup><br>March | Average |
|---------|---------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------|---------|
| NV1*    | Mailin Street                   | 90                                                                  | 72                                                                | 78                                                             | 80      |
| NV2     | Sobolev Street                  | 64                                                                  | 53                                                                | 40                                                             | 52      |
| NV3     | Main road                       | 75                                                                  | 66                                                                | 61                                                             | 66      |
| NV4     | Guldala Mosque                  | 64                                                                  | 48                                                                | 37                                                             | 49      |
| NV5     | Almerek Village                 | 55                                                                  | 46                                                                | 34                                                             | 45      |
| NV6     | Airport entrance<br>booths      | 75                                                                  | 59                                                                | 59                                                             | 63      |
| NV7     | Airside                         | 74                                                                  | 62                                                                | 46                                                             | 61      |
| NV8     | Airside by<br>existing terminal | 76                                                                  | 61                                                                | 49                                                             | 62      |

<sup>15</sup> BTEX monitoring was undertaken during the following periods: Period 1- 27/01/21-11/02/21, period 2- 11/02/21-24/02/21, period 3- 24/02/21-11/03/21

<sup>16</sup> NO<sub>2</sub> monitoring was undertaken during the following periods: Period 1- 27/01/21-17/02/21, period 2- 17/02/21-11/03/21, period 3- 11/03/21-31/03/21

Note: Site IDs 6, 7 and 8 are located within/adjacent the SPZ. \* Refers to NO<sub>2</sub>/VOC monitoring location.

- 5.3.9 Table 5.15 presents the period mean of monitored pollutant concentrations across the six weeks of VOC monitoring for all of the monitoring locations, which was derived using three separate sets of diffusion tubes. As with NO<sub>2</sub>, the averaged data cannot be directly compared with national air quality standards; however, based on the data below it was likely that the national requirements were being met. In addition, with the exception of benzene, applicable international standards (see Table 5.2) for annual mean concentrations of toluene, ethylbenzene and xylene appeared to be indicatively met.

**Table 5.15: Monitored VOC concentrations (µg/m<sup>3</sup>)**

| Site ID | Location                     | Average of six-week monitoring period between January and March 2021 |         |               |        |
|---------|------------------------------|----------------------------------------------------------------------|---------|---------------|--------|
|         |                              | Benzene                                                              | Toluene | Ethyl Benzene | Xylene |
| NV1     | Mailin Street                | 9.3                                                                  | 23.6    | 6.3           | 23.9   |
| NV2     | Sobolev Street               | 8.5                                                                  | 18.6    | 5.3           | 16.4   |
| NV3     | Main road                    | 9.1                                                                  | 21.8    | 3.2           | 16.8   |
| NV4     | Guldala Mosque               | 7.3                                                                  | 11.1    | 1.8           | 8.4    |
| NV5     | Almerek Village              | 6.0                                                                  | 11.5    | 1.8           | 10.8   |
| NV6     | Airport entrance booths      | 12.0                                                                 | 32.1    | 7.1           | 29.0   |
| NV7     | Airside                      | 7.1                                                                  | 17.3    | 4.5           | 14.2   |
| NV8     | Airside by existing terminal | 7.4                                                                  | 16.9    | 3.1           | 13.0   |

#### Particulate monitoring

- 5.3.10 In addition, monitoring for particulate matter in the form of PM<sub>10</sub> was also undertaken for the 2022 ESIA. The monitoring locations are presented in Figure 5.2, with monitoring site 1 located within the SPZ. Monitoring was undertaken at each location for a period of approximately 24 hours once a month for three months in December 2020, January 2021 and February 2022.
- 5.3.11 Monitored results show that PM<sub>10</sub> concentrations were generally high and above the national daily standard of 60µg/m<sup>3</sup> in month 1 and month 2 whilst in month 3 concentrations were lower and either below the standard or much closer to it. Generally, concentrations of PM<sub>10</sub> are much higher during the winter months compared to the summer months due to the seasonal weather conditions and the need for additional local fuel burning in people's homes. In addition, the location of the city and the common temperature inversions that are experienced means during the winter months dispersion of pollution is poor.

**Table 5.16: Monitored PM<sub>10</sub> concentrations (µg/m<sup>3</sup>)**

| Location                   | Period 1 (December 2020) | Period 2 (January 2021) | Period 3 (February 2021) |
|----------------------------|--------------------------|-------------------------|--------------------------|
| PM monitoring site 1 (PM1) | 896                      | 40                      | 16                       |
| PM monitoring site 2 (PM2) | 290                      | 212                     | 70                       |
| PM monitoring site 3 (PM3) | 1127                     | 205                     | 56                       |



## Airport Operation monitoring – August 2024

- 5.3.12 As part of Almaty Airport's requirement to undertake an annual cycle of air quality measurements at the SPZ boundary, concentrations of pollutants including NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> and VOCs were monitored on the 21<sup>st</sup> August 2024 at the same eight locations listed in Table 5.14 and Table 5.15. The monitoring period and equipment used is unknown, but it is assumed that the ambient monitoring results are spot samples and cannot be directly compared to the relevant air quality standards.
- 5.3.13 Table 5.17 presents the monitored pollutant concentrations for the eight monitoring locations for NO<sub>2</sub>. The highest concentrations were monitored along the Mailin Street (which is the main access route to and from the airport and is heavily influenced by road traffic) and within the airport by the existing terminal (within the SPZ).
- 5.3.14 VOC monitoring indicates that BTEX pollutants are well below the applicable national standards.

**Table 5.17: Monitored NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> and VOC concentrations (µg/m<sup>3</sup>)**

| Site ID   | Location                     | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> | Benzene | Toluene | P-Xylene | M-Xylene | O-Xylene |
|-----------|------------------------------|-----------------|------------------|-------------------|---------|---------|----------|----------|----------|
| NV1 / PM2 | Mailin Street                | 77              | 10               | 11                | 4.4     | <0.1    | <0.1     | <0.1     | <0.1     |
| NV2       | Sobolev Street               | 102             | -                | -                 | <1      | 3.1     | <0.1     | <0.1     | <0.1     |
| NV3       | Main road                    | 116             | -                | -                 | 3.6     | 2.1     | <0.1     | <0.1     | <0.1     |
| NV4/ PM3  | Guldala Mosque               | 100             | 82               | 41                | 2.8     | 5       | <0.1     | <0.1     | <0.1     |
| NV5       | Almerek Village              | 104             | -                | -                 | <0.1    | <0.1    | <0.1     | <0.1     | <0.1     |
| NV6       | Airport entrance booths      | 109             | -                | -                 | 7.1     | 4.7     | <0.1     | <0.1     | 1        |
| NV7       | Airside                      | 78              | -                | -                 | 2       | 4.2     | <0.1     | <0.1     | 1.3      |
| NV8/ PM1  | Airside by existing terminal | 115             | 54               | 22                | 2.6     | 5.3     | <0.1     | <0.1     | 2.1      |

Note: <0.1 means less than 0.1.

## Summary

- 5.3.15 In summary, the existing air quality monitoring data indicates that NO<sub>2</sub> concentrations are generally high both near to and within the airport boundary. In contrast, VOC concentrations are generally low whilst PM concentrations fluctuate with seasonal changes.

## Future baseline

- 5.3.16 Baseline concentrations of transport related air pollutants are expected to decline in future years due to newer less polluting cars entering the fleet and as a result of other potential improvements in emission sources across the city. Improvements in vehicle emissions are expected following the implementation of more stringent Euro emission standards within Kazakhstan which is likely to offset the increase in traffic associated with the Project. Therefore, it is likely that in the future overall pollutant concentrations may be lower than current levels.
- 5.3.17 Nonetheless, there is uncertainty surrounding the level of improvement in vehicle emissions and future electric car uptake. As such, in order to determine future concentrations for the assessment of road traffic impacts on air quality, it has been conservatively assumed that there is no change in future baseline concentrations.

## 5.4 Potential impacts

### 5.4.1 Potential air quality impacts from the Project include:

- Construction dust within 500m of construction activities
- Increase in concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> are anticipated within 200m of Mailin Street during the operational phase. These increases are attributable to a projected increase in passenger numbers accessing the airport via Mailin Road.
- Increase in ground level NO<sub>2</sub> and VOC concentrations caused by intensification of airside operations including a projected increase in LTO and associated GSE.

## 5.5 Assessment of effects

### Construction phase effects

#### Construction activities and associated impact magnitude

5.5.1 The construction phase is expected to last for approximately two and a half years between 2025 and 2028, and will consist of major construction works.

5.5.2 At this stage, there is no formal construction plan available as the final construction arrangements have not been agreed. However, based on previous project experience and the data available, the following construction activities have been assumed. Based on these activities, the dust raising potential and overall impact magnitude are presented in Table 5.18.

**Table 5.18: Construction activities and associated impact magnitude**

| Section                            | Description of works                                                                                    | Potential key activities                                          | Dust raising potential | Duration  | Impact magnitude |
|------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------------------|-----------|------------------|
| Demolition                         | Demolition of existing runway, pavement                                                                 | Mechanical demolition, mobile crushing                            | High                   | >3 months | Major            |
| Groundworks and foundations        | Excavation, soil handling, drilling, digging, concrete activities, landscaping                          | Earthmoving, excavation                                           | High                   | >3 months | Major            |
| Storage of materials onsite        | Stockpiling of materials on site                                                                        | Unloading, moving and loading of materials                        | High                   | >3 months | Major            |
| Transport of materials within site | Movement of construction materials, fill and waste materials around the site                            | Construction material moving, re-suspension of dust               | Medium                 | >3 months | Moderate         |
| Transport of materials offsite     | Delivery of materials to site and removal of wastes from site                                           | Transport of materials, re-suspension of dust                     | Low                    | >3 months | Negligible       |
| Construction of airport facilities | Construction of new in-flight catering facility, new parallel taxiway, de-icing apron, VIP apron, cargo | Concrete batching, sandblasting, asphalt paving, material cutting | High                   | >3 months | Major            |

| Section | Description of works                                                          | Potential key activities | Dust raising potential | Duration | Impact magnitude |
|---------|-------------------------------------------------------------------------------|--------------------------|------------------------|----------|------------------|
|         | apron, runway, stand positions rehabilitation. Upgrade of existing fuel farm. |                          |                        |          |                  |

- 5.5.3 The activities associated with the construction phase of the Project are conservatively assumed to have a 'high' dust raising potential throughout the whole construction period. Taking the dust raising potential and the duration of the works into account, the **magnitude** of dust effects is considered to be '**major**'.
- 5.5.4 As described in previous sections, consideration has been given to all potential receptors within the study area of the construction site boundary of the Project. In accordance with Table 5.10, the receptor **sensitivity** is classed as '**high**' based on the presence of aircraft and high-density urban areas including a children's playground within 50m of construction activities.
- 5.5.5 In accordance with the **significance** criteria presented in **ESIA Chapter 4: ESIA scope and methodology**, the risk of dust effects during the construction phase is described as '**major adverse**'. To reduce this effect, good practice dust control measures have been presented among the mitigation measures.

## Operational phase effects

### Landside

- 5.5.6 The operation assessment has been undertaken for a future year of 2030. The assessment is based upon predicted passenger numbers of 16,000,000 in 2030 which is an increase of approximately 3,700,000 from 2025. Table 5.19 to Table 5.21 present the changes in predicted concentrations at the likely worst affected receptor (closest to the road) along Mailin Street in 2030.
- 5.5.7 It has been conservatively assumed that all of the increase in passenger numbers and the associated vehicle movements to and from the airport is due to the Project. This is likely to be an overestimate as passenger numbers and vehicle movements would still increase at the airport without the Project. Therefore, the incremental increase caused by the Project would be less than has been assumed here. The assessment has also assumed that there would be no reduction in background pollutant levels in 2030 compared to 2021.
- 5.5.8 The receptor **sensitivity** is considered '**high**' as it has conservatively been assumed that concentrations of NO<sub>2</sub> would still exceed national air quality standards in 2030 and the airshed is 'degraded', as per the definition within the WBG EHS Guidelines<sup>17</sup>. The current baseline monitoring indicates that NO<sub>2</sub> concentrations are already high (80µg/m<sup>3</sup>)<sup>18</sup> along Mailin Street and well above 24-hour national air quality standard and the annual mean international air quality standards.
- 5.5.9 Table 5.19 presents the predicted without and with Project NO<sub>2</sub> concentrations for 2030 along with the incremental impact from the increased traffic associated with the Project. The results

<sup>17</sup> The General EHS Guidelines<sup>4</sup> states that "An airshed should be considered as having poor air quality if nationally legislated air quality standards or WHO Air Quality Guidelines are exceeded significantly."

<sup>18</sup> Based on the data collected it can be observed concentrations reduce in summer months compared to winter months

show that the increase in traffic due to increased passenger numbers at the airport is predicted to lead to an incremental NO<sub>2</sub> increase of 2.8µg/m<sup>3</sup>.

- 5.5.10 The predicted concentrations both without and with the Project in 2030 are lower than the 2021 baseline as the increase in traffic would be offset by a reduction in emission factors associated with less polluting vehicles entering the fleet. In addition, it is expected that the improvements in vehicle emissions, alongside other potential reductions in emissions across the city, may also lead to a reduction in future background pollutant concentrations and therefore it is likely that future pollutant concentrations will be lower than current monitored levels. In accordance with the significance criteria adopted for this assessment, the effects on sensitive receptors from NO<sub>2</sub> are conservatively described as '**moderate adverse**'. Mitigation is provided in Section 5.6.
- 5.5.11 Table 5.20 and Table 5.21 present the incremental impacts of PM<sub>10</sub> and PM<sub>2.5</sub> from the increased traffic associated with the Project. Like NO<sub>2</sub>, the predicted increases in PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are likely to be an overestimate, due to the conservative assumptions described above. Nonetheless, the incremental impacts are less than 5% of the international annual mean standards and are therefore considered to be '**negligible**'. Although baseline concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> fluctuate with seasonal changes, the incremental impact from the Project is described as **not significant**.

**Table 5.19: Predicted NO<sub>2</sub> annual mean pollutant concentrations (µg/m<sup>3</sup>)**

| Location      | Current baseline | 2030 without Project | 2030 with Project | Incremental impact | Change % | Impact magnitude | Receptor sensitivity | Evaluation of effects | Significance of effects |
|---------------|------------------|----------------------|-------------------|--------------------|----------|------------------|----------------------|-----------------------|-------------------------|
| Mailin Street | 78.4             | 61.6                 | 64.4              | 2.8                | 14.0     | Minor            | High                 | Moderate              | Significant             |

Notes: % change calculated based on international annual mean standard of 20µg/m<sup>3</sup>.

**Table 5.20: Predicted PM<sub>10</sub> annual mean pollutant concentrations (µg/m<sup>3</sup>)**

| Location      | Incremental impact | Change % | Impact magnitude | Receptor sensitivity | Evaluation of effects | Significance of effects |
|---------------|--------------------|----------|------------------|----------------------|-----------------------|-------------------------|
| Mailin Street | 0.6                | 3.0      | Negligible       | High                 | Negligible            | Not significant         |

Notes: % change calculated based on national annual mean standard of 20µg/m<sup>3</sup>.

**Table 5.21: Predicted PM<sub>2.5</sub> annual mean pollutant concentrations (µg/m<sup>3</sup>)**

| Location      | Incremental impact | Change % | Impact magnitude | Receptor sensitivity | Evaluation of effects | Significance of effects |
|---------------|--------------------|----------|------------------|----------------------|-----------------------|-------------------------|
| Mailin Street | 0.3                | 3.3      | Negligible       | High                 | Negligible            | Not significant         |

Notes: % change calculated based on national annual mean standard of 10µg/m<sup>3</sup>.

## Airside

- 5.5.12 LTO data from the Traffic Advisor<sup>19</sup> indicates that the Almaty International Airport (ALA) is expected to increase the number of passengers and ATMs. Whilst the Project is not directly responsible for the increase in passenger numbers and cargo traffic, the Project will increase the airport's capacity and therefore its ability to handle increasing ATMs and deliver on its ambition of being a regional hub airport.
- 5.5.13 Whilst ATM movements will increase, it should be noted that movements only have an impact on ground level air quality when an aircraft altitude is below 915m and therefore the key receptors are those located near to the airport itself. Considering the existing ambient NO<sub>2</sub> concentrations at these closest receptors, which is already above national air quality standards, the increase in ATMs has the potential to further increase concentrations. However, the additional contributions from increases in aircraft movements at nearby receptors is likely to be small and not significant when compared to the other main sources of air pollution in Almaty. This is demonstrated by the baseline monitoring data undertaken in 2021 which indicates that concentrations in Almerek (monitor NV5), the village located to the north-east of the runways has the lowest monitored concentrations of NO<sub>2</sub>, and Guldala, located to the south-east of the runways has the second lowest monitored concentrations of NO<sub>2</sub>.
- 5.5.14 In addition, the 2021 ambient air quality monitoring (presented in Table 5.14) indicates concentrations of NO<sub>2</sub> are approximately 10 to 15µg/m<sup>3</sup> higher within the airfield than at surrounding villages. This indicates that the impacts on air quality from airfield activities and the LTO cycle are highest close to where these activities take place, and concentrations quickly reduce with distance from the source. This supports the conclusion that increases in LTO cycles and GSEs will not have a significant effect on pollutant concentrations in nearby villages.
- 5.5.15 Table 5.22 presents the total projected NO<sub>x</sub> mass emissions from ATMs (LTO cycle) and GSE on an annual basis in the base year of 2025 and a future year of 2030. Chart 5.1 presents the projected increase in NO<sub>x</sub> emissions between 2025 and 2030, including the split between GSE and ATM.
- 5.5.16 Table 5.22 indicates that between 2025 and 2030, NO<sub>x</sub> emissions are predicted to increase by approximately 27%. This increase is predominantly accounted for by ATMs, as illustrated in Chart 5.1. In contrast, GSEs contribute only a minimal proportion of the total emissions.
- 5.5.17 Overall, the **magnitude** of effects on receptors outside the airport perimeter is considered '**negligible**' as increased airport activity is only expected to contribute a small incremental increase at receptor locations. The receptor **sensitivity** is considered '**high**' as it has conservatively been assumed that concentrations of NO<sub>2</sub> would still exceed national air quality standards in 2030 and the airshed is 'degraded', as per the definition within the WBG EHS Guidelines<sup>17</sup>. Therefore, in accordance with the **significance** criteria set out in **ESIA Chapter 4: ESIA scope and methodology**, the effects on sensitive receptors from NO<sub>2</sub> are described as '**negligible**'.
- 5.5.18 It is recommended that as part of the operational mitigation of the airport an emissions inventory and emissions control plan should be developed to further understand and mitigate future emissions where possible. Section 5.6 provides examples of mitigation measures for inclusion across a ten-year horizon.

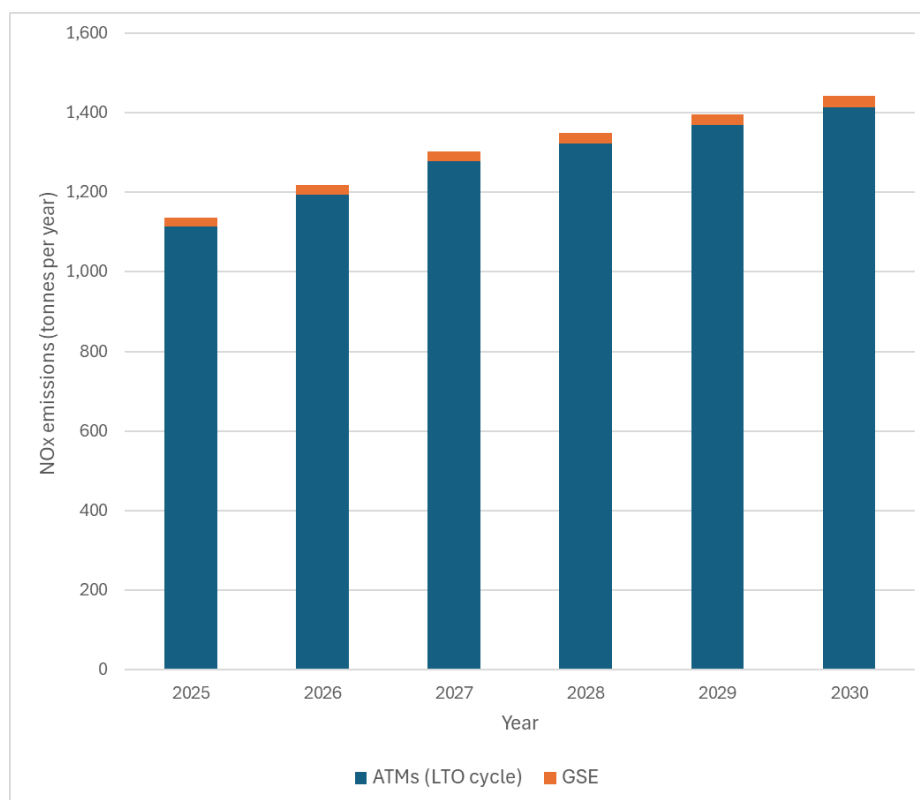
<sup>19</sup> Mott MacDonald (2025). Project Horizon Traffic Advisor in relation to the new Investment plan of Almaty International Airport in Kazakhstan, Traffic Forecasts Outputs (Base, Low, Climate) - DRAFT (NON-RELIANCE BASIS), Version 6.0, 29 July 2025.

**Table 5.22: Projected NO<sub>2</sub> emissions from LTOs and GSE (tonnes per year)**

| Source                   | Current baseline<br>(2025) | 2030 with Project | Change % |
|--------------------------|----------------------------|-------------------|----------|
| Ground Support Equipment | 23                         | 28                | 22       |
| Landing Take-Off         | 1,113                      | 1,413             | 27       |

Source: Air Traffic Forecast (Mott MacDonald, 2025)

**Chart 5.1: LTO and GSE mass emission projection between 2025 and 2030 (tonnes per year)**



Source: Air Traffic Forecast (Mott MacDonald 2025)

## Operational impacts and effects – occupational health

- 5.5.19 Ambient monitoring presented in Section 5.3, demonstrates that existing pollutant concentrations of NO<sub>2</sub> and VOCs, which are the main pollutants associated with airport operations, are well below relevant air quality standards set for occupational exposure and therefore **sensitivity** is described as '**negligible**' as they are judged to be below 50% of the relevant standard even when accounting for differences in averaging periods of the monitoring and the standards.
- 5.5.20 The future contributions to NO<sub>2</sub> and VOC concentrations associated with the increased number of LTOs and GSEs are not anticipated to result in significant increases in pollutant concentrations within the airport perimeter. Even if it was conservatively assumed that the increase in airport activity contributed to a doubling of VOC and NO<sub>2</sub> concentrations, these increases would still likely be below 5% of the relevant standard (noting that monitoring undertaken for the Project is long term averages and occupation standards are for 15 minute and 8 hour averaging periods). Therefore, the **magnitude** of change is considered '**negligible**'.

- 5.5.21 In accordance with the **significance** criteria set out in **ESIA Chapter 4: ESIA scope and methodology**, the effects on occupational health from NO<sub>2</sub> and VOCs are described as ‘negligible’ and **not significant**.

## 5.6 Mitigation

- 5.6.1 Mitigation measures to manage potential air quality impacts during construction and operation of the Project are already being implemented as part of the air quality management plan (within the wider Environmental and Social Management Plan (ESMP)) produced for the Almaty Airport Expansion in 2022. The same mitigation measures are applicable to this Project and are in alignment with the IFC EHS guidelines. The mitigation measures that are being implemented will control the following emission sources within and in the vicinity of the airport boundary (and SPZ):

- Dust emissions during construction
- Emissions from mobile sources and any generators during operation and construction
- Emissions associated with increased road and air traffic movements during operation

- 5.6.2 The 2022 ESMP also includes a requirement for ambient air quality monitoring, which is currently being undertaken through quarterly surveys. However, the monitoring programme should be strengthened by increasing the frequency of sampling and improving sampling methods. With particular relevance to Mailin Street, ambient NO<sub>2</sub> monitoring should be undertaken to track trends in concentrations and assess compliance with national air quality standards.

- 5.6.3 Daily visual inspections will be undertaken at construction areas across the site by a suitably qualified/experienced member of the construction team throughout the construction phase to monitor the implementation and effectiveness of prescribed mitigation measures. ALA will be responsible for ensuring that all contractors implement the mitigation measures during the construction of the Project.

- 5.6.4 In addition, the IFC General EHS Guidelines provide recommended prevention and control techniques for fugitive emissions, which should be implemented to control fugitive emissions associated with the operation of the fuel farm. Examples of techniques include:

- Monitoring of VOCs around the fuel farm
- Modifying equipment e.g. using a closed-vent system for any compressors and a seal-less design in valves and pumps
- Implementing a leak detection and repair (LDAR) program that controls fugitive emissions by regularly monitoring to detect leaks, and implementing repairs within a predefined time period

## 5.7 Summary of residual effects

Residual effects after the application of mitigation are presented in Table 5.23. Following application of mitigation all effects are considered not significant with the exception of the increase in pollutant concentrations at receptors adjacent to Mailin Street as a result of increased traffic. This is primarily as the effects of the proposed mitigation to reduce emissions associated with travel to and from the airport cannot be quantified at this stage due to uncertainties associated with future electric car uptake.



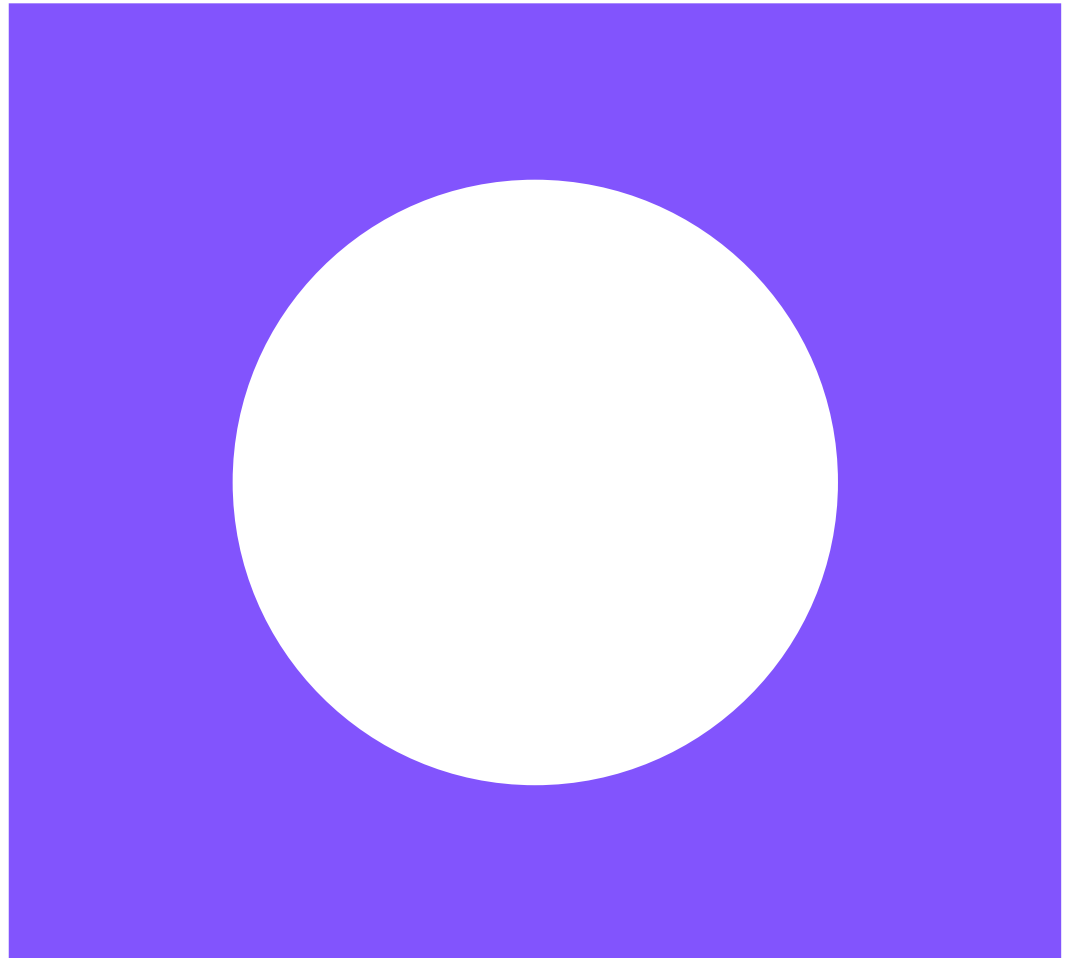
**Table 5.23: Summary of residual effects for air quality**

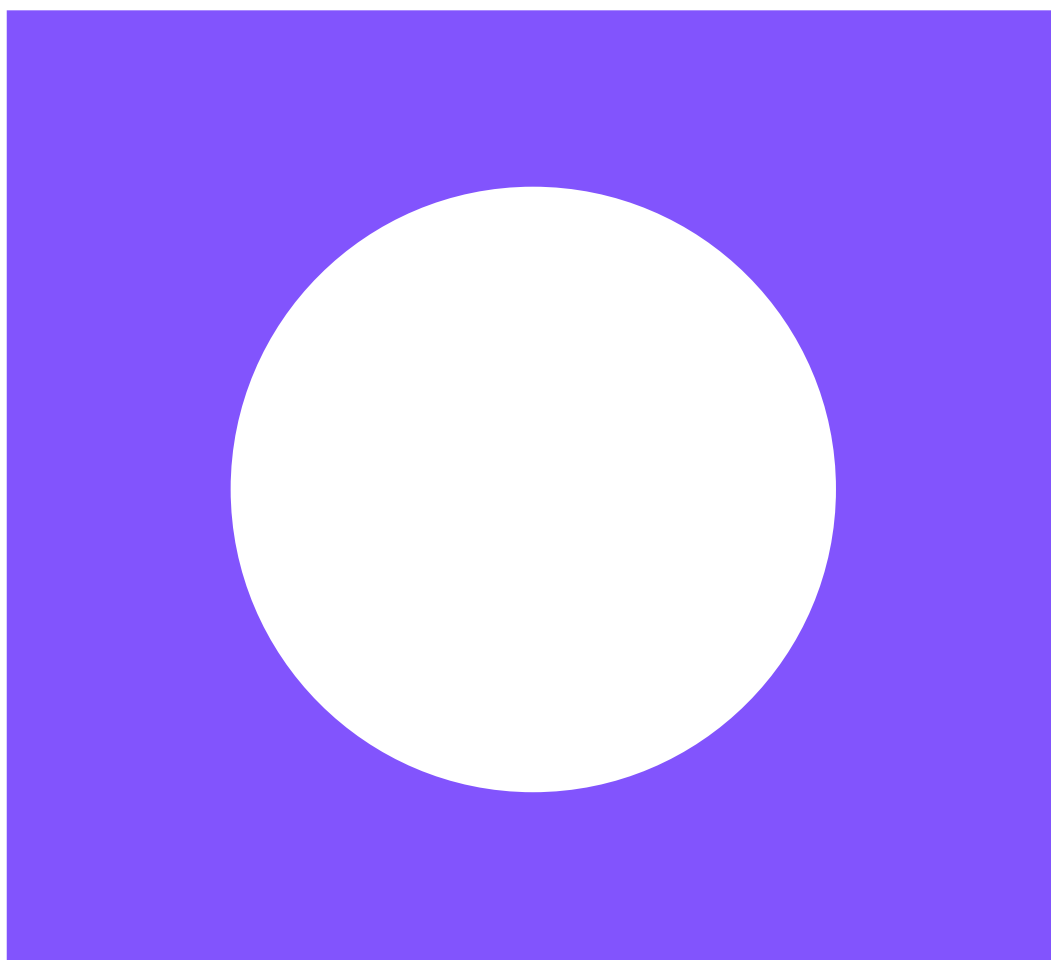
| Description of effect                                                                 | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Residual effect | Proposed monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction phase</b>                                                             |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Dust nuisance from construction activities on sensitive receptors located within 500m | Temporary              | High                    | Major               | Major adverse (Significant)                         | <p>The following measures should continue to be implemented which are already being implemented as part of the 2022 ESMP / air quality management plan:</p> <ul style="list-style-type: none"> <li>● Minimising dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment such as water suppressors</li> <li>● Minimising dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content</li> <li>● Implementing dust suppression techniques on unpaved roads, such as applying water or non-toxic chemicals to minimize dust from vehicle movements</li> <li>● No bonfires and burning of waste materials shall be allowed</li> <li>● Planning land clearing, removal of topsoil and excess materials, location of haul roads, tips and stockpiles with due consideration to meteorological factors (e.g. precipitation, temperature, wind direction, and speed) and location of sensitive receptors</li> <li>● Designing, installing and applying a simple, linear layout for materials-handling operations to reduce the need for multiple transfer points</li> <li>● Compacting and periodically grading and maintaining roads within the airport boundary</li> <li>● Vegetating exposed surfaces of stockpiled materials.</li> <li>● Managing the blending, packing, loading, unloading of bulk cement, aggregates, bitumen and filler materials for batching plants, if required for construction, by:</li> </ul> | Negligible      | <p>Monitor dust by undertaking daily on-site and off-site visual inspections where receptors are nearby. This should include regular dust soiling checks of surfaces at sensitive receptor locations within 100m of site boundary.</p> <p>Increase the frequency of inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.</p> <p>A record of visual inspections, including the results, should be kept and dust control methods and implementation reviewed where</p> |

| Description of effect                                                                     | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Residual effect | Proposed monitoring                 |
|-------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------|
|                                                                                           |                        |                         |                     |                                                     | <ul style="list-style-type: none"> <li>Containing dusty processes: containment and arrestment are the preferred option for control of emissions to air from processes handling cement and asphalt</li> <li>Suppressing dust using water or proprietary suppressants. Where water is used for dust suppression, processes require an adequate supply of water. To demonstrate an adequate water supply on tanks, a low-level alarm will be fitted.</li> <li>Protecting external sources, such as stockpiles and external conveyors, from wind whipping is necessary. There are various methods that may be used to this end. Crushed rock, sand or coarse aggregate, can be delivered, stored and handled so as to minimise dust emissions, for example by dampening or covering.</li> <li>Plan site layout so that batching plant, including materials handling and stockpiling, are located away from sensitive receptors, as far as is possible.</li> </ul> |                 | excessive dust soiling is recorded. |
| Emissions management from mobile sources (on-road, off-road vehicles and mobile crushers) | Temporary              | High                    | Negligible          | Negligible                                          | <p>The following measures should continue to be implemented which are already being implemented as part of the 2022 ESMP / air quality management plan:</p> <ul style="list-style-type: none"> <li>Regardless of the size or type of vehicle, owners / operators will implement the manufacturer recommended engine maintenance programmes</li> <li>Enforce a speed limit for Heavy Goods Vehicles (HGVs) on-site at 20km per hour</li> <li>Drivers will be instructed on the benefits of driving practices that reduced both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits</li> <li>Enforce a 'no-idling' policy</li> <li>Old construction vehicles will be replaced with newer more fuel-efficient alternatives where possible</li> <li>Convert high use vehicles to cleaner fuels where possible</li> </ul>                                                                             | Negligible      | None                                |

| Description of effect                                                                                                                         | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Residual effect                | Proposed monitoring                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                               |                        |                         |                     |                                                     | <ul style="list-style-type: none"> <li>Install and maintain emission control devices such as catalytic convertors</li> <li>Implement a regular vehicle maintenance and repair programme</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                       |                                |                                                                                                                                                                                                              |
| Emissions management for generators                                                                                                           | Temporary              | High                    | Negligible          | Negligible                                          | <p>With regards to any generators used on site:</p> <ul style="list-style-type: none"> <li>Consider the location and height of exhaust pipes to ensure proper dispersion of pollutants.</li> <li>Use generators of a modern design and keep them well-maintained following original equipment manufacturer (OEM) maintenance schedule.</li> </ul>                                                                                                                                                                                                                                        | Negligible                     |                                                                                                                                                                                                              |
| <b>Operational phase – public health</b>                                                                                                      |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                |                                                                                                                                                                                                              |
| Increased pollutant concentrations as a result of emissions from operation traffic (both air and road) on receptors adjacent to Mailin Street | Permanent              | High                    | Minor               | Moderate adverse (Significant)                      | <p>The following measure, already included in the 2022 ESMP, should continue to be implemented but not be limited to:</p> <ul style="list-style-type: none"> <li>Develop an operational traffic management strategy to reduce emissions from passenger and staff transport. This should include: <ul style="list-style-type: none"> <li>Infrastructure for electric vehicles, such as charging stations, to support the transition to low-emission cars and buses.</li> <li>Staff travel plans that encourage carpooling and other sustainable commuting options.</li> </ul> </li> </ul> | Moderate adverse (Significant) | Increase frequency and improve methods of ambient air quality monitoring, particularly for NO <sub>2</sub> at Mailin Street. Conduct monthly monitoring to track trends and compare with national standards. |
| Increased pollutant concentrations as a result of emissions from increased airport operations on receptors                                    | Permanent              | High                    | Negligible          | Negligible                                          | <p>The following measure, already included in the 2022 ESMP, should continue to be implemented:</p> <ul style="list-style-type: none"> <li>An emissions control plan should be developed setting out how the airport will reduce emissions associated with increased ATMs in future years.</li> <li>As a minimum this should require a detailed emission inventory to be developed setting out current emissions for the year it is compiled and be broken down to ATMs, APUs and GSEs.</li> </ul>                                                                                       | Negligible                     | As above                                                                                                                                                                                                     |

| Description of effect                                                                         | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Residual effect | Proposed monitoring                     |
|-----------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------|
| located in nearby villages                                                                    |                        |                         |                     |                                                     | <ul style="list-style-type: none"> <li>The plan should set out measures that the airport will implement to reduce emissions and should include, as a minimum: <ul style="list-style-type: none"> <li>Limited run times on APUs</li> <li>Provision of airside electric charging to facilitate transition to electric GSEs</li> <li>Requirement of reduced thrust take offs, where applicable</li> <li>Reduced engine run taxiing</li> <li>Optimisation of service infrastructure to reduced aircraft and ground vehicle movements</li> <li>Selecting cleaner fuels for firefighting drills</li> <li>Set out a clearly defined air quality monitoring plan to monitor air quality impacts and effectiveness of emission control measures</li> <li>Provision of landside charging infrastructure to promote the use of electric transport provision</li> </ul> </li> </ul> |                 |                                         |
| Risk of increased emissions from fuel farm operations on receptors located in nearby villages | Permanent              | High                    | Negligible          | Negligible                                          | Update the air quality management plan to include prevention and control measures for fugitive emissions from fuel farm operations. Measures should include: <ul style="list-style-type: none"> <li>Monitoring of VOCs around the fuel farm</li> <li>Equipment modifications to reduce emissions</li> <li>Implementation of a LDAR program</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Negligible      | Monitoring of VOCs around the fuel farm |
| <b>Operational phase – occupational health</b>                                                |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                                         |
| Increased emissions from airport activities on airport workers                                | Permanent              | Negligible              | Negligible          | Negligible                                          | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Negligible      | None                                    |





# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 6

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 6**

September 2025



# Issue and Revision Record

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# Contents

|                                        |    |
|----------------------------------------|----|
| Acronyms and abbreviations             | 1  |
| 6 Biodiversity                         | 2  |
| 6.1 Introduction                       | 2  |
| 6.2 Methodology                        | 2  |
| Applicable guidelines and standards    | 2  |
| Area of Influence for biodiversity     | 4  |
| Data collection                        | 6  |
| Limitations and assumptions            | 6  |
| 6.3 Baseline                           | 6  |
| Overview of biodiversity in Kazakhstan | 6  |
| Current baseline                       | 7  |
| Future baseline                        | 11 |
| 6.4 Potential impacts                  | 11 |
| 6.5 Assessment of effects              | 12 |
| Construction phase effects             | 12 |
| Operational phase effects              | 12 |
| 6.6 Mitigation                         | 14 |
| 6.7 Summary of residual effects        | 15 |

## Tables

|                                                                                                                  |    |
|------------------------------------------------------------------------------------------------------------------|----|
| Table 6.1: Relevant national legislation/policies in Kazakhstan relating to biodiversity                         | 2  |
| Table 6.2: Habitat types in the 500m AoI of the Project                                                          | 7  |
| Table 6.3: Bird species known to occur within the airport and their associated risk of aircraft collision (2020) | 9  |
| Table 6.4: Proposed mitigation measures for the Project                                                          | 14 |
| Table 6.5: Summary of residual effects for biodiversity                                                          | 16 |

## Figures

|                                                          |   |
|----------------------------------------------------------|---|
| Figure 6.1: Biodiversity AoI for the Project             | 5 |
| Figure 6.2: Habitat types in the 500m AoI of the Project | 8 |

# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                                                      |
|------------------------|---------------------------------------------------------------------------------|
| AIS                    | Alien invasive species                                                          |
| ALA                    | Almaty International Airport                                                    |
| AoI                    | Area of Influence                                                               |
| CBD                    | Convention on Biological Diversity                                              |
| C-ESMP                 | Construction Environmental and Social Management Plans                          |
| CITES                  | Convention on International Trade of Endangered Species of Wild Fauna and Flora |
| CMS                    | Convention on the Conservation of Migratory Species of Wild Animals (CMS)       |
| EBRD                   | European Bank for Reconstruction and Development                                |
| EIA                    | Environmental Impact Assessment                                                 |
| ESIA                   | Environmental and Social Impact Assessment                                      |
| ESMP                   | Environmental and Social Management Plan                                        |
| ESR6                   | Environment and Social Requirement 6                                            |
| IBA                    | Important Bird and Biodiversity Area                                            |
| IBAT                   | Integrated Biodiversity Assessment Tool                                         |
| IFC                    | International Finance Corporation                                               |
| IUCN                   | International Union for the Conservation of Nature                              |
| KBA                    | Key Biodiversity Area                                                           |
| PS6                    | Performance Standard 6                                                          |
| WHMP                   | Bird and Wildlife Hazard Prevention Program                                     |

## 6 Biodiversity

### 6.1 Introduction

- 6.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) provides a comprehensive overview of biodiversity within the Project area, located in the urban environment of Almaty, Kazakhstan. It presents the baseline ecological conditions based on secondary data, including habitat types, species presence, and legally protected areas. In addition to describing the existing biodiversity context, the chapter assesses the potential impacts of the Project on local flora and fauna. It also outlines appropriate mitigation measures to avoid and minimise adverse effects, in alignment with national environmental regulations and international best practice.

### 6.2 Methodology

- 6.2.1 The methodology described in section 4.7 of the **ESIA Chapter 4: ESIA scope and methodology** was followed. Bespoke biodiversity-related methodology is provided below.

#### Applicable guidelines and standards

- 6.2.2 The assessment has been undertaken considering relevant legislation, standards, and guidance as summarised in the sections below. As outlined in **ESIA Chapter 3: Policy, legal and institutional framework**, the International Finance Corporation (IFC) Performance Standards and the European Bank for Reconstruction and Development (EBRD) Environmental and Social Requirements have been followed to undertake this assessment. This specifically included IFC Performance Standard 6 (PS6) and EBRD Environment and Social Requirement 6 (ESR6): Biodiversity, Conservation and Sustainable Management of Living Natural Resources, as these relate to biodiversity.
- 6.2.3 In addition to the applicable overarching policy and legislation for the Project that is presented in **ESIA Chapter 3: Policy, legal and institutional framework**, additional policy and legislation which specifically relates to biodiversity for the Project is presented below.
- 6.2.4 National legislation and policy in Kazakhstan relating to biodiversity applicable to the Project is shown in Table 6.1.

**Table 6.1: Relevant national legislation/policies in Kazakhstan relating to biodiversity**

| Legislative or policy instrument                  | Relevant details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kazakhstan's Environmental Code No. 400-VI (2021) | For projects likely to affect the environment, the Environmental Impact Assessment (EIA) process must:<br>Identify potential negative impacts on biodiversity through baseline studies and ecological assessments.<br>Propose mitigation measures to avoid or minimise harm to ecosystems and species.<br>Include monitoring plans to track biodiversity impacts during and after project implementation.                                                                                                                                    |
| Forest Code (2006)                                | The Forest Code includes guidance on the ecologically protective functions of forests, conservation of their biological diversity, sustainable use of forest resources and forest ecosystem regeneration and restoration (including reforestation and afforestation). It regulates the ownership, use and management of the areas assigned to the Forest Fund, and establishes the legal framework for the protection, reproduction and improvement of the ecological and resource potential of the Forest Fund areas. It also prohibits the |

| Legislative or policy instrument                        | Relevant details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                         | introduction of invasive alien species and the collection of rare and endangered flora species within Forest Fund land.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Land Code (2003)                                        | The Land Code primarily regulates land management but also includes chapters on the land of protected natural areas, the land of the state forest fund and the “reserve lands”.                                                                                                                                                                                                                                                                                                                                                                                                            |
| Law on Protection, Reproduction and Use of Fauna (2019) | This Law regulates the protection of rare and endangered animal species, as well as the sustainable use and reproduction of game and fish resources. It contains provisions on the preservation of wildlife habitats, and concentration areas and migration routes of their populations.                                                                                                                                                                                                                                                                                                   |
| Law on Specially Protected Natural Areas (2006)         | The Law on Specially Protected Natural Areas establishes different categories of protected areas, their legal status, functional zonation pattern and protective regimes. A 2012 amendment included new articles on the Red Book of Kazakhstan and key ornithological areas. It regulates creation, expansion, protection, restoration, sustainable use and management of nature conservation areas and national nature reserves, which have ecological, scientific, historical, cultural and recreational value and are a component of national, regional and global ecological networks. |
| Ministry of Agriculture Order #18-02/1057 (2015)        | All the trees in cities within Kazakhstan (including airports) are subject to protection irrespective of their conservation status. They cannot be cut without permission or paying a tariff as set out in The Government of RoK Decree #441, 2007. Often, as a condition of the construction permit, developers are obliged to plant and maintain seedlings to offset the impact from the city tree cover reduction.                                                                                                                                                                      |
| The Government of RoK Decree #441 (2007)                | This decree outlines basic tariffs for illegal logging, damaging trees and shrubbery (tariffs are doubled in protected areas), theft of wind-fallen trees and trees damaged by forest fires. The decree is applicable to public forests.                                                                                                                                                                                                                                                                                                                                                   |

#### 6.2.5 Relevant international regulations are listed below:

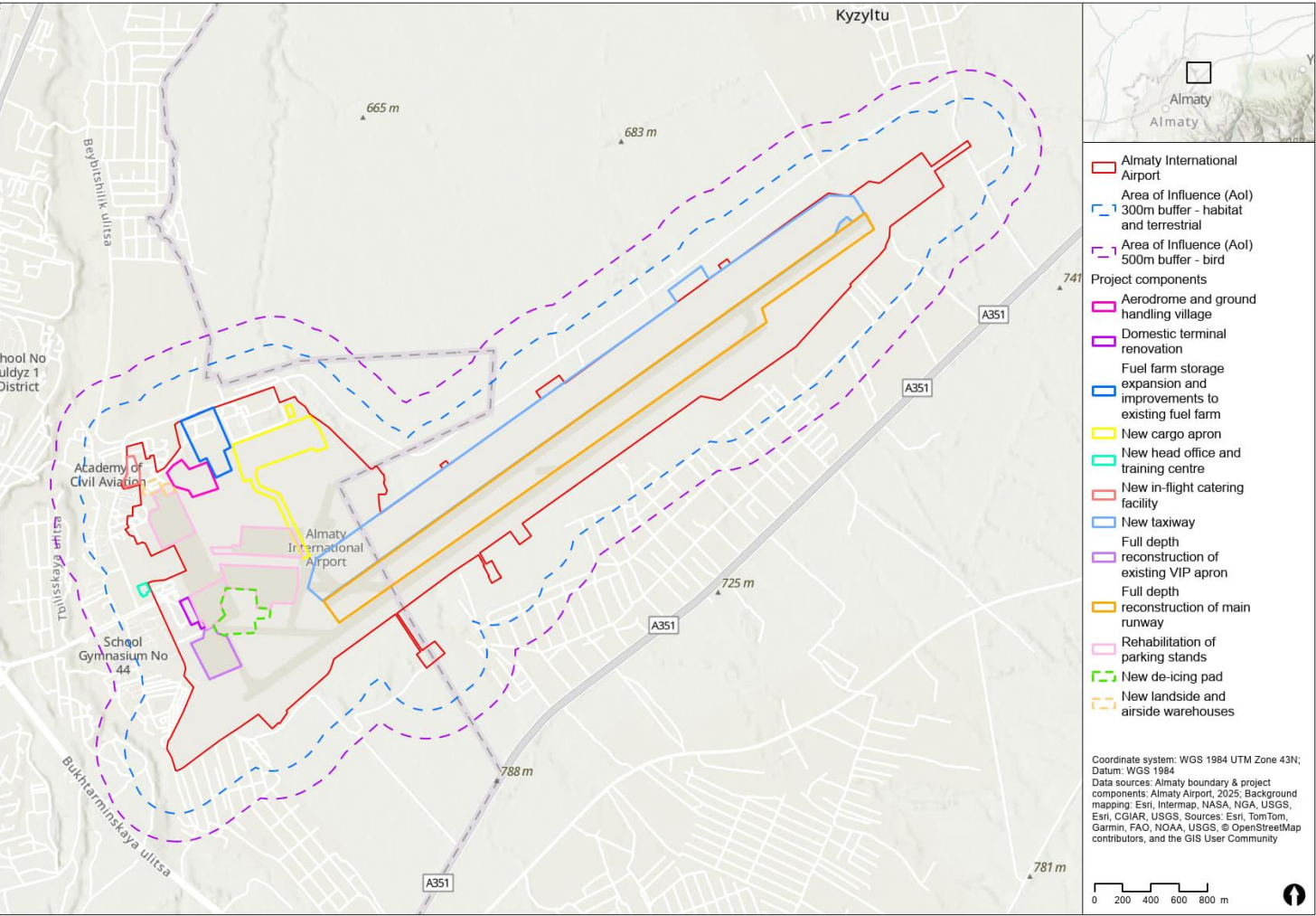
- Convention on Biological Diversity (CBD)
  - Ratified by Kazakhstan: 1994
  - Definition of Biodiversity: Variability among all living organisms and ecosystems.
  - Key Obligations:
    - Protect national biodiversity
    - Require EIAs for projects affecting biodiversity
  - Integrate biodiversity into environmental legislation and policy
- Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES)
  - Kazakhstan – member since 2000
  - Purpose: Regulate international trade to prevent species extinction
  - Appendices:
    - Appendix I: Species threatened with extinction – trade only for non-commercial purposes
    - Appendix II: Species that may become threatened – trade allowed with permits
    - Appendix III: Species needing international cooperation – trade allowed with documentation
- Convention on the Conservation of Migratory Species of Wild Animals (CMS)
  - Ratified by Kazakhstan: 2006
  - Purpose: Conserve migratory species and their habitats
  - Key Actions:
    - Protect endangered migratory species (Appendix I)

- Cooperate on species needing international efforts (Appendix II)
- IFC PS6
  - Focus: Biodiversity conservation and sustainable resource management
  - Objectives:
    - Protect biodiversity and ecosystem services
    - Promote sustainable use of natural resources
  - Requirements:
    - Assess biodiversity impacts
    - Consider stakeholder biodiversity values
    - Address threats like habitat destruction and invasive species
  - Habitat Categories:
    - Modified: Minimise degradation, enhance where possible
    - Natural: Avoid significant conversion unless justified and mitigated
    - Critical: No measurable adverse impacts allowed; strict mitigation required
- EBRD ESR6
  - Objectives:
    - Use a precautionary approach to biodiversity
    - Apply mitigation hierarchy to achieve no net loss or net gain
    - Maintain ecosystem services
    - Promote sustainable natural resource use
  - Critical Habitat Criteria:
    - Threatened/unique ecosystems
    - Habitats for endangered, endemic, or migratory species
    - Areas vital for evolutionary processes

### **Area of Influence for biodiversity**

6.2.6 The Area of Influence (AoI) for biodiversity has been delineated based on the outcomes of the impact assessment, following an iterative evaluation of the Project's potential effects on ecological receptors. The spatial extent of the AoI reflects the anticipated reach of direct and indirect impacts identified during the assessment. As a result, a buffer of 300m has been established around the Project footprint to account for potential impacts on habitats, flora, mammals, and reptiles. For bird species, a wider buffer of 500m has been applied. These defined zones provide the basis for targeted mitigation planning and monitoring efforts. Figure 6.1 presents the defined Biodiversity AoI for the Project.

Figure 6.1: Biodiversity Aol for the Project



## Data collection

6.2.7 The biodiversity baseline description has been developed based on secondary data, obtained from the references below, as well as primary data collected by the airport team, under the birds and wildlife management plan and monitoring:

- CBD website (<https://www.cbd.int/>).
- International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (<http://www.iucnredlist.org>).
- Integrated Biodiversity Assessment Tool (IBAT) (<https://ibat-alliance.org/>).
- The Red List of Republic of Kazakhstan (<http://redbook.kz/en/index.html>).
- BirdLife International Data Zone (<http://www.birdlife.org/datazone/home>).
- Global Invasive species database ([http://www.iucngisd.org/gisd/100\\_worst.php](http://www.iucngisd.org/gisd/100_worst.php)).

6.2.8 Previous studies undertaken at the airport, relevant to biodiversity, have been reviewed and include:

- The 2022 ESIA
- 'ANALYSIS – ornithological situation and collisions of aircraft with birds/wildlife animals at the Almaty airfield in 2024' (2025)<sup>1</sup>
- Bird and Wildlife Hazard Prevention Program (WHMP) (2025)<sup>2</sup> – a program for preventing the dangerous presence of birds and other animals at the aerodrome and has been developed for the purpose of implementing reasonable measures to control risks posed by birds and other animals at Almaty International Airport. Measures as part of the program include eliminating elements that may attract birds and other animals, controlling the presence of birds and other animals at the aerodrome and in adjacent areas, and reducing risks associated with collisions with birds/other animals.
- Instruction for Maintenance and Protection of Green Spaces (2024)

## Limitations and assumptions

6.2.9 The IBAT data used to inform the baseline was acquired in 2021. Given that IBAT species statuses are updated biannually, there is a possibility that some species' conservation statuses may have changed since the data was obtained. However, this limitation is addressed through ongoing wildlife hazard monitoring conducted at the airport. These monitoring activities provide updated records of species presence, abundance, and behaviour in the vicinity of the airport, helping to validate and refine the baseline biodiversity understanding and ensuring that the assessment remains aligned with current ecological conditions.

## 6.3 Baseline

### Overview of biodiversity in Kazakhstan

6.3.1 Kazakhstan's vast territory supports a rich diversity of ecosystems and species, including forests, steppes, deserts, and mountains. The country is home to over 6,000 species of higher vascular plants, 5,000 fungi, and nearly 900 vertebrate species, many of which are threatened due to habitat loss and hunting. Endemism is notably high among fungi and plants, with 14% of higher plant species being unique to Kazakhstan. Alien invasive species (AIS), such as the myna bird, brown rat, and American mink, are impacting native fauna, and 26 of the country's

---

<sup>1</sup> Almaty International Airport (2025). ANALYSIS – ornithological situation and collisions of aircraft with birds/wildlife animals at the Almaty airfield in 2024

<sup>2</sup> Almaty International Airport (2025). Bird and Wildlife Hazard Prevention Program



150 fish species are invasive. Although Kazakhstan has a biodiversity conservation plan extending to 2030, it currently lacks a comprehensive AIS information and control system.

## Current baseline

### Legally protected and internationally recognised areas

- 6.3.2 The Project is located approximately 4.8km west of the 'Almaty State Nature Sanctuary (complex)' national designation and approximately 11km northwest of 'Big Almaty Gorge' Important Bird and Biodiversity Area (IBA) and Key Biodiversity Area (KBA). Almaty State Nature Sanctuary is classed as an IUCN Management Category IV protected area designated in 2001, and is measured at 5,424km<sup>2</sup>. The Big Almaty Gorge IBA/KBA encompasses an area of 1,136.6km<sup>2</sup> and was designated for several bird species in 2007.
- 6.3.3 The Project area does not contain functionally linked habitat with the IBA and KBA or national designation and it is therefore unlikely that the key features of the IBA/KBA will be present within the Project area.

### Habitats

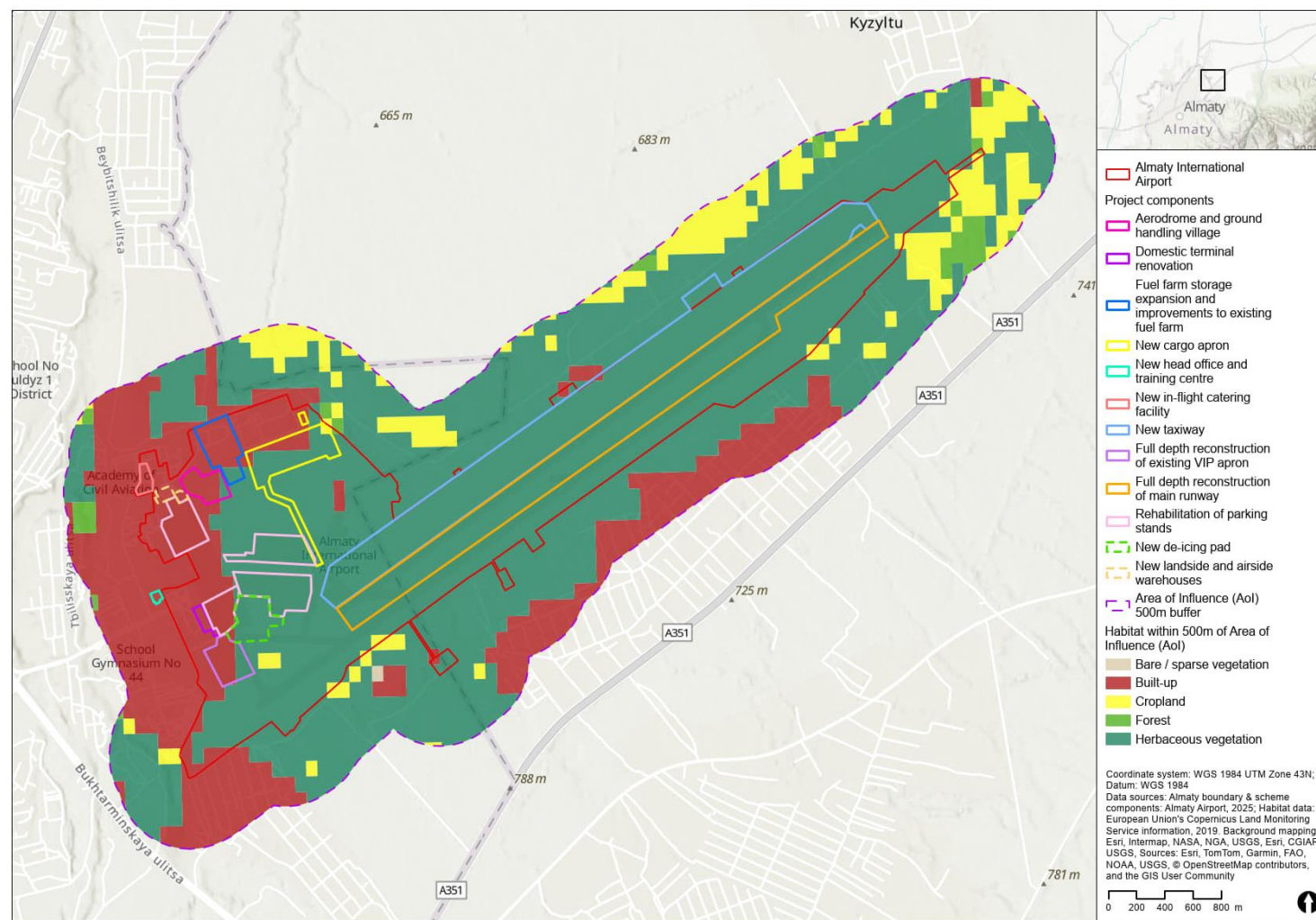
- 6.3.4 The Project footprint is located entirely within the boundaries of an existing operational airport and consists of fully modified habitat. The area is predominantly hardstanding, scattered with small, managed vegetated patches. These green areas are actively maintained to minimise the risk posed by wildlife to airport operations. There are no watercourses within the Project footprint; the nearest watercourse is the Malaya Almatinka River which borders the airport to the west. The Kotur-Bulak river crosses underneath the airport runways through a culvert.
- 6.3.5 The area to the west of the airport is primarily urban, comprising residential development with some industrial uses. To the north and south, the landscape transitions into agricultural land, interspersed with areas of shrub, scrub, and grassland.
- 6.3.6 Five habitat types were present within the footprint of the Project and the surrounding 500m buffer (data obtained from Copernicus<sup>3</sup>), these are presented in Table 6.2 and shown in Figure 6.2.

**Table 6.2: Habitat types in the 500m Aol of the Project**

| Habitat type             | Area (ha)   |
|--------------------------|-------------|
| Herbaceous vegetation    | 1084.245437 |
| Cropland                 | 130.356765  |
| Built-up                 | 381.132366  |
| Bare / sparse vegetation | 0.886500414 |
| Forest                   | 22.562724   |

<sup>3</sup> Copernicus, 2019. Available at: <https://land.copernicus.eu/en/products/global-dynamic-land-cover/copernicus-global-land-service-land-cover-100m-collection-3-epoch-2019-globe> [Last accessed: August 2025].

**Figure 6.2: Habitat types in the 500m Aol of the Project**



Almaty Airport ESIA | Biodiversity - Habitat within 500m Area of Influence (Aol) | 21 Aug 2025

## Flora

- 6.3.7 During a field survey undertaken for the 2022 ESIA, the following tree and shrub species were identified within the Project Aol: cedar elm, ash, white poplar, sweet chestnut (*Castanea sativa*), weeping birch (*Betula pendula*), common lime tree (*Tilia vulgaris*), false acacia (*Robinia pseudoacacia*), black oak (*Quercus velutina*), cut-leaved maple (*Acer negundo*), yokewood (*Catalpa longissima*), scots pine (*Pinus sylvestris*), siberian spruce (*Picea obovata*), white cedar (*Thuja occidentalis*), common juniper (*Juniperus communis*), English elm (*Ulmus campestris*), common lilac (*Syringa vulgaris*), dog-rose (*Rosa canina*), panicked dogwood (*Cornus racemosa*), dikuscha currant (*Ribes dikuscha*), salmonberry (*Rubus spectabilis*) and various fruit trees. Their relevant abundance was not determined due to the absence of leaves, flowers and fruits at this time of year.
- 6.3.8 Due to the time of year and the snow cover, no herbaceous species were identified during the 2022 ESIA field survey. However, a previous site visit of the airport (as part of the Environmental and Social Due Diligence Assessment) identified xerophytic species such as feathergrass (*Stipa* sp.), fescue (*Festuca* sp.) and prairie june grass (*Koeleria macrantha*).
- 6.3.9 None of the plant species mentioned above are protected, threatened, endemic or rare, and no IAS were identified during the field survey.

## Birds

- 6.3.10 The primary factors contributing to bird-aircraft collisions include the presence of bird migration routes over the airfield, nearby agricultural lands, and the existence of illegal waste dumps in the vicinity.
- 6.3.11 Based on the 2020 data provided by Almaty International Airport (ALA), and as presented in the 2022 ESIA, a list of birds occurring within the airport and their risk levels to aircraft has been collated (see Table 6.3). Two of significant risk (level 4), seven at high risk (level 3), nine at moderate risk (level 2) and 12 at low risk (level 1) were identified. The two species identified as of significant risk of bird strike (level 4) are long eared owl and European roller. However, according to the WHMP data for 2024, the risk associated with these species has since been reduced to moderate.

**Table 6.3: Bird species known to occur within the airport and their associated risk of aircraft collision (2020)**

| Species name         | Scientific name            | Red List status <sup>1</sup> | Status   | Collision Risk Assessment | Degree of collision risk |
|----------------------|----------------------------|------------------------------|----------|---------------------------|--------------------------|
| Long-eared owl       | <i>Asio otus</i>           | LC                           | Resident | Significant               | 4                        |
| European roller      | <i>Coracias garrulus</i>   | LC                           | Migrant  | Significant               | 4                        |
| Rock dove            | <i>Columba livia</i>       | LC                           | Resident | High                      | 3                        |
| Ring-necked pheasant | <i>Phasianus colchicus</i> | LC                           | Resident | High                      | 3                        |
| Buzzard              | <i>Buteo buteo</i>         | LC                           | Migrant  | High                      | 3                        |
| Common kestrel       | <i>Falco tinnunculus</i>   | LC                           | Migrant  | High                      | 3                        |
| Eurasian sparrowhawk | <i>Accipiter nisus</i>     | LC                           | Resident | High                      | 3                        |
| Mallard              | <i>Anas platyrhynchos</i>  | LC                           | Migrant  | High                      | 3                        |
| Common pochard       | <i>Aythya ferina</i>       | VU                           | Migrant  | High                      | 3                        |
| European turtle dove | <i>Streptopelia turtur</i> | VU                           | Resident | Moderate                  | 2                        |
| Carion crow          | <i>Corvus corone</i>       | LC                           | Resident | Moderate                  | 2                        |

| Species name           | Scientific name             | Red List status <sup>1</sup> | Status   | Collision Risk Assessment | Degree of collision risk |
|------------------------|-----------------------------|------------------------------|----------|---------------------------|--------------------------|
| Hooded crow            | <i>Corvus cornix</i>        |                              | Resident | Moderate                  | 2                        |
| Barn swallow           | <i>Hirundo rustica</i>      | LC                           | Migrant  | Moderate                  | 2                        |
| Common blackbird       | <i>Turdus merula</i>        | LC                           | Resident | Moderate                  | 2                        |
| Demoiselle crane       | <i>Grus virgo</i>           | LC; Cat V                    | Migrant  | Moderate                  | 2                        |
| Eurasian coot          | <i>Fulica atra</i>          | LC                           | Migrant  | Moderate                  | 2                        |
| European herring gull  | <i>Larus argentatus</i>     | LC                           | Migrant  | Moderate                  | 2                        |
| Black-headed gull      | <i>Larus ridibundus</i>     | LC                           | Migrant  | Moderate                  | 2                        |
| Magpie                 | <i>Pica pica</i>            | LC                           | Resident | Low                       | 1                        |
| Rook                   | <i>Corvus frugilegus</i>    | LC                           | Resident | Low                       | 1                        |
| Western jackdaw        | <i>Coloeus monedula</i>     | LC                           | Resident | Low                       | 1                        |
| Common myna            | <i>Acridotheres tristis</i> | LC                           | Resident | Low                       | 1                        |
| Common starling        | <i>Sturnus vulgaris</i>     | LC                           | Migrant  | Low                       | 1                        |
| Great tit              | <i>Parus major</i>          | LC                           | Resident | Low                       | 1                        |
| House sparrow          | <i>Passer domesticus</i>    | LC                           | Resident | Low                       | 1                        |
| Eurasian tree sparrow  | <i>Passer montanus</i>      | LC                           | Resident | Low                       | 1                        |
| White wagtail          | <i>Motacilla alba</i>       | LC                           | Migrant  | Low                       | 1                        |
| Eurasian siskin        | <i>Carduelis spinus</i>     | LC                           | Resident | Low                       | 1                        |
| Grey-crowned goldfinch | <i>Carduelis caniceps</i>   | LC                           | Resident | Low                       | 1                        |
| Common chaffinch       | <i>Fringilla coelebs</i>    | LC                           | Resident | Low                       | 1                        |

Source: 2022 ESIA. Key: IUCN status: VU = Vulnerable, LC = Least Concern. Kazakhstan Red List status: Cat V = out of danger. Note 1: IUCN, 2021; National Red List.

### 6.3.12

Based on data collected through the ongoing Almaty Airport Bird and Wildlife Management Plan, a list of species present in the airport area and on the airfield has been compiled. This list is informed by direct observations as well as the collection and analysis of bird remains following wildlife strike incidents. From this dataset, and accounting for species' irreplaceability and vulnerability, the following key risk categories have been developed:

- High risk species: black kite (*Milvus migrans*), carrion crow (*Corvus corone*), domestic dog (*Canis* sp.), rock dove (*Columbia livia*). None of these species are considered threatened under the IUCN Red List but are deemed high risk due to their risk/probability of collision. In addition, the common pochard (*Aythya ferina*), black swift (*Cypseloides niger*) and European turtle-dove (*Streptopelia turtur*) are classified as Vulnerable (VU) under the IUCN Red List and are therefore included as high risk due to their irreplaceability.
- Moderate risk species: 26 species are included in this category. None of these species are considered threatened under the IUCN Red List.
- Very low risk: nine species fall under this category. None of these are considered threatened under the IUCN Red List.

## Mammals

### 6.3.13

For the 2022 ESIA, no mammal species were recorded within the airport or the study area. A follow up survey in April 2021 noted yellow ground squirrels and jackals (*Canis aureus*) (both IUCN Least Concern). Ten ground squirrel burrows were recorded at the eastern end of the runway, and a jackal was seen outside the northern fence of the airport. Jackals feed at the numerous fly tipping locations around the airport and hunt pheasants and ground squirrels.

## Reptiles

- 6.3.14 No reptiles were identified within the study area during the baseline surveys undertaken for the 2022 ESIA.

## Critical habitat

- 6.3.15 Based on the baseline provided above, as well as the substantially modified nature of the habitats in the Aol, it is considered unlikely that the Project meets critical habitat thresholds as per the PS6 and ESR6 definitions.

## Future baseline

- 6.3.16 Given the nature of the Project and its highly developed surroundings, it is assumed that the future baseline should not change significantly from the current baseline provided above. Monitoring of fauna should continue, and mitigation measures identified in Section 6.6 should be followed. Should residual impacts be identified after these measures are implemented, adaptive management should be considered.

## 6.4 Potential impacts

- 6.4.1 The main potential impacts from the Project on biodiversity receptors include:

- Construction
  - Increased noise levels from the demolition and re-construction of the main runway
  - Vegetation removal in small green spaces within the Aol associated with construction activities, leading to permanent loss of modified habitat
  - Increased artificial lighting and vibration from construction activities, vehicles and machinery leading to disturbance of wildlife
  - Injury and death of wildlife from vehicle movements
  - Increased emissions from construction equipment, machinery and vehicle movements
  - Dust emissions and deposition from land clearing, road works, extraction of material from quarries/borrow pits, material storage, loading/unloading/transportation of materials, wind blowing of stockpiles, etc. Dust deposition can degrade the habitats and affect species around the construction site.
  - Exposed excavations where wildlife may be entrapped
  - Pollution of soil and water from run-offs, accidental spills, wastewaters, sewage and cleaning of equipment, which may lead to degradation of habitats
  - Construction waste leading to habitat degradation
- Operation
  - Increased air and road traffic movements leading to:
    - An increase in noise, artificial lighting, and vibration leading to disturbance of wildlife
    - An increase in pollution and degradation of habitats
    - An increased risk of wildlife collision with road and air traffic

## 6.5 Assessment of effects

### Construction phase effects

#### Habitats

- 6.5.1 All habitats within the AoI are considered to be modified. Vegetation clearance, dust emissions and other construction activities could affect habitats within the AoI.
- 6.5.2 Impacts on modified habitats within the AoI (considered to be **low** sensitivity) due to construction activities are considered to be of **minor** magnitude, with the resulting effect being **negligible** and **not significant**.

#### Flora

- 6.5.3 According to the 2022 ESIA, all species recorded within the Project footprint are common in Kazakhstan and are not protected or threatened (**low** sensitivity). Damage to flora species is considered to be an impact of **minor** magnitude, with the resulting effect being **negligible** and **not significant**.

#### Birds

- 6.5.4 Bird feeding grounds could potentially be present within the AoI due to the presence of insects accumulating in vegetated areas, leading to bird feeding activities in the airfield. Disturbance from the presence of people, artificial light spill and noise on bird species during construction in the AoI is of **minor** magnitude as the local context already includes an operational airport. The sensitivity of birds is **medium**, and therefore the significance of the effect is **minor adverse** and **not significant**.

#### Other faunal groups

- 6.5.5 No significant effects are anticipated for other faunal groups during the construction phase. Baseline data and field observations did not identify the presence of sensitive or conservation-significant species among mammals, reptiles or amphibians within the AoI. These groups are considered to be of **low** sensitivity, and construction activities are not expected to result in measurable impacts. Therefore, the resulting effect is **negligible** and **not significant**.

### Operational phase effects

#### Habitats

- 6.5.6 All habitats within the construction footprint are considered to be modified and are of **low** sensitivity as they support limited biodiversity. No additional loss or impacts are expected on these habitats during operation. Given the impacts of **negligible** magnitude, the resulting effect will be **negligible** and **not significant**.
- 6.5.7 Impacts on other habitats within the AoI due to air and soil pollution related to operational activities are considered to be of **minor** magnitude, with the resulting effect being **negligible** and **not significant**.

#### Flora

- 6.5.8 As species identified are deemed to be of **low** sensitivity, the operational impacts including air and soil pollution on flora within the AoI are considered to be of **minor** magnitude, with the resulting effect being **negligible** and **not significant**.

## Birds

- 6.5.9 Collision risk from air traffic: The risk categories used in the operational phase assessment build on the integrated framework introduced in Section 6.1.3, which considers species occurrence, vulnerability to collision, and irreplaceability (e.g. conservation status). This ensures that species identified as rare or threatened are appropriately prioritised in the impact assessment, even if their collision probability is lower. The categorisation used below reflects this combined approach, aligning aviation safety risk with biodiversity value.
- 6.5.10 The main threat identified to birds during operation is deemed to be bird strikes associated with air traffic. Based on the baseline data presented in Section 6.3.12, these are separated into three categories according to the risk categorisation. The data utilised is from the most recent findings on site (2024).
- High risk species: their sensitivity to collisions from air traffic is deemed to be **high**, and the magnitude of impact is considered **moderate**. The resulting significance is **major adverse (significant)**.
  - Moderate risk species: their sensitivity is deemed to be **medium**, and the magnitude of impact is **moderate**, resulting in a **moderate adverse (significant)** effect.
  - Very low risk species: their sensitivity is deemed to be **low**, and the magnitude of impact **moderate**, resulting in a **minor adverse (not significant)** effect.
- 6.5.11 Other operational activities: Other impacts such as disturbance caused by additional noise, artificial lighting, presence of people and the movement of vehicles will represent an impact of **minor** magnitude on birds during operation. Given the context of a fully operational airport already existing on site, the sensitivity of this receptor is deemed to be **low**. This results in a **negligible adverse** and **not significant** effect.

## Other faunal groups

- 6.5.12 Operational activities are not expected to result in significant impacts on other faunal groups beyond birds. Species such as mammals, amphibians, and reptiles are either absent from the immediate airport environment or are considered to have **low** sensitivity to the types of disturbance associated with airport operations. Given the existing operational context of the airport and the limited suitability of the surrounding habitat for these groups, any potential impacts such as noise, lighting, or human presence are assessed as **negligible** and **not significant**.

## Wildlife hazard risk to airport operations

- 6.5.13 Wildlife, particularly bird activity, presents a recognised operational risk to aviation safety due to the potential for bird strikes. This risk is being actively managed through the implementation of a Wildlife Hazard Management Plan (WHMP), which is currently in place and operating to satisfaction. The WHMP aligns with ICAO and EASA guidance, incorporating regular monitoring, deterrence measures, and adaptive management strategies to reduce the likelihood of wildlife-aircraft interactions.
- 6.5.14 The WHMP presents a review of bird collisions in the past year, with the most commonly recorded species including black crow (*Corvus corone*), rock pigeon (*Columba livia*), migratory swallows and black kite (*Milvus migrans*). Additional raptor species recorded include kestrel (*Falco tinnunculus*), sparrowhawk (*Accipiter nisus*), peregrine falcon (*Falcon peregrinus*), and long-eared owl (*Asio otus*), among others. These records are based on both direct observations and strike incident data.
- 6.5.15 While the WHMP provides a strong foundation for managing wildlife risks, some gaps remain, particularly in the systematic integration of species' irreplaceability (e.g. IUCN status) and

vulnerability into threshold-setting. To address this, adaptive management thresholds (see Table 6.4 for details) shall be refined to account not only for collision frequency but also for species conservation status and rarity. This will ensure that even infrequent collisions involving high-conservation-value species trigger appropriate mitigation responses. Ongoing monitoring under the WHMP will continue to inform updates to species risk categorisation and threshold values. Identified gap, such as limited seasonal data for migratory raptors, will be addressed through targeted surveys and coordination with ornithological experts.

- 6.5.16 Despite the effectiveness of current measures, wildlife hazards remain a residual operational risk due to the dynamic nature of wildlife behaviour and seasonal variability. In line with IFC Performance Standard 6 and international aviation safety frameworks, this risk is assessed using a likelihood vs. consequence matrix:

**Likelihood:** *Unlikely* – due to ongoing WHMP implementation and monitoring

**Consequence:** *Major* – due to the potential severity of a wildlife strike on aircraft safety

**Risk Rating:** *Moderate* – requiring continued mitigation and monitoring

- 6.5.17 The risk is considered to be reduced to **As Low As Reasonably Practicable (ALARP)** through the current WHMP. Ongoing evaluation and periodic updates to the plan will ensure continued alignment with best practice and regulatory expectations.

## 6.6 Mitigation

### Construction phase biodiversity management

- 6.6.1 During the construction phase, biodiversity-related mitigation measures will be integrated into the Contractors' Construction Environmental and Social Management Plans (C-ESMPs). These C-ESMPs will be aligned with the overarching Environmental and Social Management Plan (ESMP) and will include specific actions to avoid, minimise, and manage potential impacts on biodiversity, in accordance with the mitigation hierarchy and the measures outlined in Table 6.4.

### Operation phase wildlife management

- 6.6.2 ALA has developed management plans, detailed in the WHMP, to address increased insect presence due to vegetation, thereby reducing bird presence for feeding purposes. The wildlife management procedures in place to discourage bird species from the airport will continue during and after construction. As a result, no increased risk of bird strike is anticipated during the operation phase of the Project. Proposed mitigation measures for the Project's activities are provided in Table 6.4.

**Table 6.4: Proposed mitigation measures for the Project**

| Type of measure | Project phase | Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Biodiversity    | Construction  | <ul style="list-style-type: none"> <li>Store hazardous materials (e.g., fuel, chemicals) in bunded areas with spill kits and emergency procedures.</li> <li>Minimise dust and pollution via water spraying, covered stockpiles, damped internal roads, and speed limits (max 20 kph).</li> <li>Fence construction sites for security and wind control; clean soil from vehicle wheels before exit.</li> <li>Cover trucks transporting excavated soil to prevent dust dispersion.</li> <li>Cover or fence excavations to prevent wildlife access; monitor trenches and install escape routes where needed.</li> <li>Minimise noise and light disturbance; direct artificial lighting downward.</li> </ul> |



| Type of measure                           | Project phase | Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                           |               | <ul style="list-style-type: none"> <li>• If vegetation clearance is required during the bird breeding season (April–June), it is recommended that the Engineering, Procurement, and Construction (EPC) Contractor seeks confirmation or guidance from ALA's Wildlife Hazard Management team prior to proceeding.</li> <li>• Raise awareness among staff about wildlife protection and speed limits.</li> <li>• Reassess presence of AIS before works begin; contain and report any AIS found.</li> <li>• Prevent AIS spread via packaging, material movement, and vehicle wash-downs; source materials locally where possible.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Biodiversity – management of bird strikes | Operation     | <p>Additional, non-habitat measures will continue to be implemented to reduce the bird strike risk. Currently implemented measures include:</p> <ul style="list-style-type: none"> <li>• Regular bird watch patrols on stand-by</li> <li>• Regular cleaning of seeds and insects to reduce the likelihood of this being used by birds for feeding.</li> <li>• Use of chemical, acoustic or visual repellents.</li> <li>• Use of pyrotechnics in the form of yellow, green or red flares to scare birds away.</li> <li>• Use of propane thunder cannon, involving imitating shots through a 'clap' sound. This is utilised near the runway from March to the end of October.</li> <li>• Use of laser repellents used to scare birds away up to 4km.</li> <li>• Mechanical bird repeller – designed to scare away birds that are/appear to be in the path of an aircraft.</li> <li>• Firing of blank rounds to scare birds away by simulating a gunshot.</li> <li>• Use of bird signals to imitate predator calls.</li> <li>• Use of periodic distress calls of birds that need to be scared away.</li> </ul> <p>These measures will continue to be implemented, and the results monitored to ensure their effectiveness is maintained.</p> <p>Adaptive management thresholds will be set by ALA. These thresholds should be quantitative and in line with PS6 requirements. Should the data/monitoring suggest these have been exceeded, adaptive management (e.g. deploying avian radar systems for real-time bird movement tracking) should be implemented as appropriate.</p> |

## 6.7 Summary of residual effects

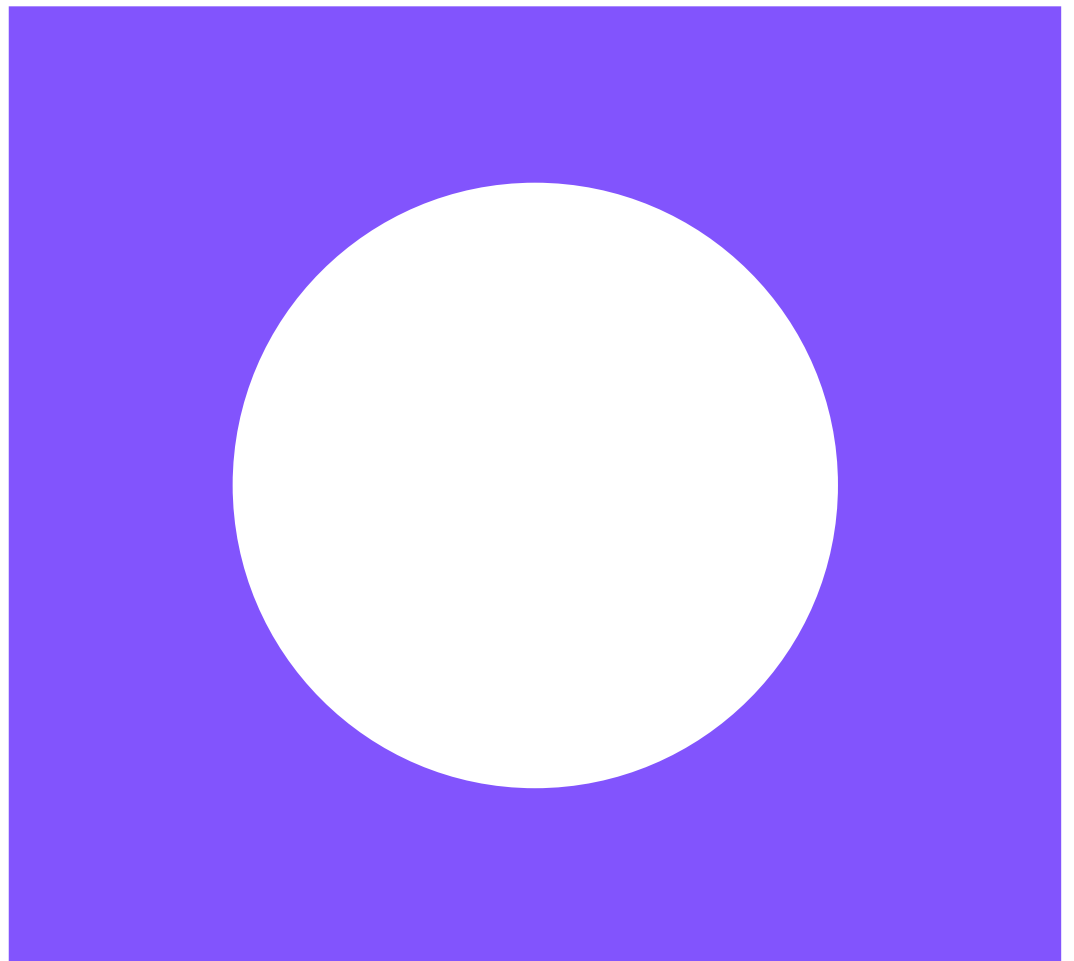
6.7.1 Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. These are presented in Table 6.5.

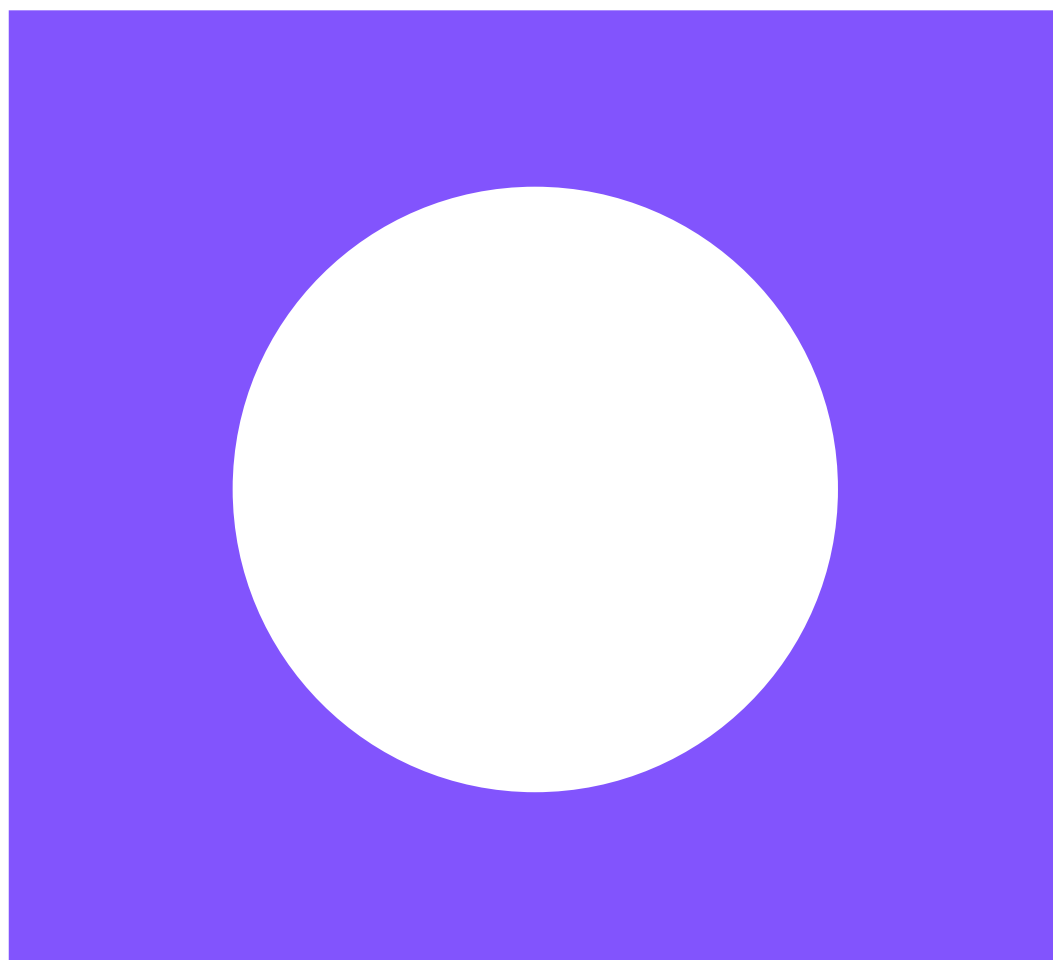
6.7.2 In summary, minor adverse residual effects will be present for high and moderate risk bird species. It is proposed that continued monitoring of bird species present on site, as well as maintenance of a record of these and identification of those affected by bird strikes is undertaken. Should an increase in bird strikes be encountered, adaptive management should be undertaken.

**Table 6.5: Summary of residual effects for biodiversity**

| Description of effect                                                                                                                             | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                            | Residual effect                 | Proposed monitoring                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Construction phase</b>                                                                                                                         |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                  |                                 |                                                                                                                           |
| Pollution and permanent loss of terrestrial habitat and flora                                                                                     | Permanent              | Low                     | Minor               | Negligible – Not significant                        | N/A                                                                                                                                                                                                                                                              | N/A                             | N/A                                                                                                                       |
| Terrestrial wildlife – road traffic collision, fauna becoming entrapped in open excavations, artificial lighting and noise and vibration impacts. | Permanent              | Low                     | Minor               | Negligible – Not significant                        | Fence off open excavations, rescue entrapped animals, ensure the perimeter fence remains uncompromised, minimise artificial lighting, noise and vibration effects during works, and integrate a vehicle movement plan to minimise deaths from vehicle movements. | Negligible – Not significant.   | During construction activities, as outlined in Section 6.6.                                                               |
| Birds - artificial lighting and noise and vibration impacts.                                                                                      | Permanent              | Medium                  | Minor               | Minor adverse                                       | Implement measures to minimise noise and vibration disturbance to birds, implement artificial lighting shaders to prevent light spillage, carry out bird nesting checks 48 hours before vegetation clearance and implement a vehicle movement plan.              | Negligible – Not significant    | During construction activities, as outlined in Section 6.6.                                                               |
| <b>Operational phase</b>                                                                                                                          |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                  |                                 |                                                                                                                           |
| Pollution and permanent loss of terrestrial habitat and flora                                                                                     | Permanent              | Low                     | Minor               | Negligible – Not significant                        | N/A                                                                                                                                                                                                                                                              | N/A                             | N/A                                                                                                                       |
| Birds (high, moderate and low risk species) – air traffic strikes                                                                                 | Permanent              | Low                     | Moderate            | Moderate adverse                                    | Regular bird watch patrols, use of chemical, auditory and visual deterrents for birds, and maintenance of vegetation and Use grass species that are less attractive                                                                                              | Minor adverse – Not significant | Continued monitoring of birds' populations within the airport by qualified ornithologists, and maintenance of a record of |

| Description of effect                                                                                                                                            | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                            | Residual effect | Proposed monitoring                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|--------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                  |                        |                         |                     |                                                     | to birds, to minimise feeding habits in the Aol. |                 | bird strikes and, where possible, identification of affected species. Should these experience a pattern of increase, adaptive management will be implemented. |
| Birds (other operational activities) – additional noise from increased airport capacity, artificial lighting, presence of people and movement of vehicles.       | Permanent              | Low                     | Minor               | Negligible – Not significant                        | N/A                                              | N/A             | N/A                                                                                                                                                           |
| Terrestrial wildlife (other faunal groups) – additional noise from increased airport capacity, artificial lighting, presence of people and movement of vehicles. | Permanent              | Low                     | Minor               | Negligible – Not significant                        | N/A                                              | N/A             | N/A                                                                                                                                                           |





# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 7**

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 7**

September 2025

# Issue and Revision Record

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| B        | 10/09/2025 | GM         | SG/NvD   | KD/BM    | Updated report following external comments |
| C        | 12/09/2025 | SM         | KD       | BM       | Updated report with minor corrections      |
|          |            |            |          |          |                                            |
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|          |            |            |          |          |                                            |

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# Contents

|                                          |    |
|------------------------------------------|----|
| Acronyms and abbreviations               | 1  |
| 7 Climate resilience                     | 2  |
| 7.1 Introduction                         | 2  |
| 7.2 Methodology                          | 2  |
| Applicable guidelines and standards      | 2  |
| Area of influence for climate resilience | 3  |
| Methodological approach                  | 4  |
| Limitations and assumptions              | 6  |
| 7.3 Baseline                             | 6  |
| Current baseline                         | 6  |
| Future baseline                          | 7  |
| 7.4 Potential impacts                    | 9  |
| Operation                                | 9  |
| 7.5 Assessment of effects                | 10 |
| Operational phase effects                | 10 |
| 7.6 Additional mitigation                | 11 |
| 7.7 Summary of residual effects          | 12 |

## Tables

|                                                                                                          |   |
|----------------------------------------------------------------------------------------------------------|---|
| Table 7.1: Vulnerability matrix using sensitivity and exposure from the EBRD Paris Alignment Methodology | 4 |
| Table 7.2: Criteria for assessing the probability of hazards affecting the Project                       | 5 |
| Table 7.3: Risk Matrix                                                                                   | 5 |

# Acronyms and abbreviations

| Abbreviation /<br>Acronym | Definition                                            |
|---------------------------|-------------------------------------------------------|
| ALA                       | Almaty International Airport                          |
| CCRA                      | Climate Change Risk Assessment                        |
| EBRD                      | European Bank for Reconstruction and Development      |
| ESIA                      | Environmental and Social Impact Assessment            |
| ESMP                      | Environmental and Social Management Plan              |
| EWMP                      | Extreme Weather Management Plan                       |
| mm                        | Millimetres                                           |
| NbS                       | Nature-based solutions                                |
| UNFCCC                    | United Nations Framework Convention on Climate Change |
| °C                        | Degrees Celsius                                       |

# 7 Climate resilience

## 7.1 Introduction

- 7.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) has been prepared with reference to the Climate Change Risk Assessment (CCRA) produced by WSP<sup>1</sup> for Project Horizon. This chapter outlines the climate baseline relevant to the Project, summarises the key findings of the CCRA, and presents an assessment of the likely significant environmental effects of climate change on the Project's operation.
- 7.1.2 Where necessary, mitigation measures have been identified and proposed to mitigate significant effects.
- 7.1.3 The construction phase has been scoped out, since construction is planned to be complete by 2028 and therefore will be subject to the current climate, not to additional impacts of climate change.

## 7.2 Methodology

### Applicable guidelines and standards

- 7.2.1 This section outlines the key industry frameworks and best practice approaches that have informed the development of the CCRA. While the proposed developments are currently at an early design stage, the assessment has been undertaken to support climate-resilient planning and decision-making. These standards have guided the methodology to ensure consistency with recognised climate adaptation principles and support climate-resilient planning and decision-making for the Project.
- 7.2.2 Project Horizon's CCRA has been developed in alignment with key industry standards, including ISO 14090:2019 – Adaptation to Climate Change<sup>2</sup> and the European Bank for Reconstruction and Development (EBRD) Paris Alignment methodology<sup>3</sup>.

### National policy requirements

- 7.2.3 The CCRA acknowledges the current status of Kazakhstan's national climate adaptation policy framework. While a formal National Adaptation Plan is still under development, Kazakhstan has submitted periodic National Communications to the UN Framework Convention on Climate Change (UNFCCC), with the most recent published in 2017<sup>4</sup>. This report highlights increasing frequency and intensity of extreme weather events, noting that "*The frequency of extreme weather events and their overall intensity are gradually increasing and it poses a threat to the country in terms of higher pressure on the environment and potentially adverse effects on the economy.*" The report also mentions the environmental and economic impacts, and outlines ongoing efforts to integrate climate adaptation into national strategies and programmes.

---

<sup>1</sup> WSP (2025) Chapter 9: Physical Climate Change Risk Assessment, Draft Red Flag Report 10th July 2025. 2025UK383375.

<sup>2</sup> ISO (2019) Adaptation to Climate Change – Principles, requirements and guidelines. Available at: [ISO 14090:2019 - Adaptation to climate change](#) (accessed: September 2025)

<sup>3</sup> EBRD (2024) Methodology to determine the Paris Agreement alignment of EBRD investments. Available at: [Green Economy Transition \(GET\) and Paris alignment](#) (accessed: September 2025)

<sup>4</sup> Ministry of Energy of the Republic of Kazakhstan (2017) Seventh National Communication and third Biennial report of the Republic of Kazakhstan to the UN Framework Convention on Climate Change. Available at: [20963851\\_Kazakhstan-NC7-BR3-1-ENG\\_Saulet\\_Report\\_12-2017\\_ENG.pdf](#) (accessed: September 2025)

- 7.2.4 In the absence of a formal National Adaptation Plan, the CCRA has taken a proactive approach by reviewing regional climate projections, identifying climate risks to the Project, and recommending adaptation measures. This ensures that the Project aligns with good practice in climate resilience, even in the absence of a fully defined national adaptation framework.

### International policy requirements and guidance

- 7.2.5 The CCRA approach to ensure Paris Agreement alignment reflects the principles set out in the EBRD guidance<sup>5</sup> and draws on established best practice frameworks for climate vulnerability and resilience.
- 7.2.6 Established best practice frameworks include JASPERS Guidance – The Basics of Climate Change Adaptation, Vulnerability, and Risk Assessment<sup>6</sup>, which provides foundational principles for evaluating climate-related risks and vulnerabilities in infrastructure projects. It also includes ISO 14090: Adaptation to Climate Change – Principles, Requirements and Guidelines<sup>7</sup>, which sets out a framework for integrating climate adaptation into organisational decision-making and project design.

### Area of influence for climate resilience

- 7.2.7 The study area for the CCRA is defined as the Project footprint and the physical assets such as runways and ancillary structures, and social receptors which include staff and passengers that will be present at the airport.
- 7.2.8 The CCRA evaluates both current and future climate conditions relevant to the Project. The baseline climate has been assessed using historical data from the past three decades (1991–2020), covering temperature, precipitation, wind, and extreme weather events. For future climate projections, the assessment considers four distinct time horizons to reflect the likely operational lifetime of the Project. Consideration of these time horizons ensure climate risks are assessed appropriately across its lifecycle:
- **Short-term:** 2030s (2020–2039)
  - **Medium-term:** 2050s (2040–2059)
  - **Medium-term:** 2070s (2060–2079)
  - **Long-term:** 2090s (2080–2099)
- 7.2.9 Given the uncertainty around the design life of individual project components, the assessment has applied a precautionary approach by evaluating operational climate risks across all future time horizons. In particular, the 2090s (2080–2099) have been used to assess long-term operational impacts, recognising that ongoing maintenance, repair, and replacement will occur throughout this period. This approach ensures that resilience measures are informed by the full range of projected climate conditions over the Project's expected lifespan.
- 7.2.10 For the Climate Resilience topic, receptors are elements of the Project. As such, the following receptors are assessed, as outlined within the CCRA:
- Taxiway and main runway (new taxiway and refurbishment of main runway);
  - Apron and parking stand (new cargo and parking stands and apron refurbishment);
  - De-icing pad (construction of a new de-icing pad);

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<sup>5</sup> EBRD (2024) Methodology to determine the Paris Agreement alignment of EBRD investments. Available at: [Green Economy Transition \(GET\) and Paris alignment](#) (accessed: September 2025)

<sup>6</sup> JASPERS (2017) The basics of climate change adaptation, vulnerability and risk assessment. Available at: [The basics of climate change adaptation, vulnerability and risk assessment](#) (accessed: September 2025)

<sup>7</sup> ISO (2019) Adaptation to climate change – Principles, requirements and guidelines. Available at: [ISO 14090:2019 - Adaptation to climate change](#) (accessed: September 2025)

- Fuel farm (new tanks and connecting infrastructure, improvement to the railway unloading bay);
- Drainage and wastewater treatment (new and upgraded infrastructure);
- New buildings (ground handling and aerodrome village (Storage buildings), technical centre (offices and warehouse), inflight catering facility, central warehouse, new head office).

## Methodological approach

7.2.11 This section summarises the methodology for assessing climate risks to the Project.

7.2.12 The assessment involved a vulnerability analysis to identify the climate hazards that may affect the Project. This included evaluating both exposure (the likelihood of climate hazards occurring at the Project location), and sensitivity (how susceptible key Project components are to those hazards), where:

$$\text{Vulnerability} = \text{Exposure} \times \text{Sensitivity}$$

7.2.13 The exposure analysis was informed by historical climate data and future projections, using sources such as the World Bank Climate Change Knowledge Portal<sup>8</sup> and other publicly available datasets. This approach enabled a qualitative assessment of potential climate risks under both current and future conditions.

7.2.14 Sensitivity of Project components to climate hazards was determined using a combination of literature review, engagement with Project representatives, and professional judgement. This initial sensitivity assessment was conducted independently of any existing design measures or adaptive capacity. These factors were considered later in the process, specifically within the physical climate risk assessment, and only for components identified as having potentially material climate risks through the earlier vulnerability assessment.

7.2.15 The matrix in Table 7.1 helps to identify which climate risks may be considered material based on the combined assessment of exposure and sensitivity, guiding the prioritisation of components for further risk assessment and adaptation planning. Note that Projects for which the sensitivity exposure combination is shaded grey are not considered subject to potential material physical climate risks.

**Table 7.1: Vulnerability matrix using sensitivity and exposure from the EBRD Paris Alignment Methodology**

| Sensitivity \ Exposure | Not likely | Plausible                                  | Probable                                   |
|------------------------|------------|--------------------------------------------|--------------------------------------------|
| Very high              |            | Potentially material physical climate risk | Potentially material physical climate risk |
| High                   |            |                                            | Potentially material physical climate risk |
| Medium                 |            |                                            |                                            |
| Low                    |            |                                            |                                            |

Source: Project Horizon Physical Climate Change Risk Assessment (WSP, 2025), as taken from the EBRD Methodology to determine the Paris Agreement alignment of EBRD investments

7.2.16 Following the identification of potentially material climate risks through the vulnerability assessment, the CCRA evaluated the potential impacts that could result from climate change. Each impact was assessed based on its likelihood of occurrence and the severity of its

<sup>8</sup> World Bank Group. (2021) Climate Change Knowledge Portal. Available at: [Climate Change Knowledge Portal | Climate Change Knowledge Portal](https://climateknowledgeportal.worldbank.org/) (accessed: September 2025)

consequences. The assessment also considered existing design measures, actions, and Project commitments that contribute to climate resilience.

7.2.17 To guide this evaluation, the CCRA applied assessment criteria outlined in the JASPERS Guidance, presented in Table 7.2, ensuring a structured and consistent approach to determining the significance of climate-related risks and the effectiveness of proposed adaptation measures.

**Table 7.2: Criteria for assessing the probability of hazards affecting the Project**

| Likelihood | Rare (1)                                                      | Unlikely (2)                                                                                               | Possible (3)                                                                           | Likely (4)                                                                                                  | Almost certain (5)                                                                                                                              |
|------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Definition | Highly unlikely to occur                                      | Given current practices and procedures, this incident is unlikely to occur                                 | Incident has occurred in a similar country / setting                                   | Incident is likely to occur                                                                                 | Incident is very likely to occur, possibly several times                                                                                        |
| Severity   | Insignificant (1)                                             | Minor (2)                                                                                                  | Moderate (3)                                                                           | Major (4)                                                                                                   | Catastrophic (5)                                                                                                                                |
| Definition | Minimal impact that can be mitigated through normal activity. | An event which effects the normal project operation, resulting in localised impacts of a temporary nature. | A serious event requiring additional actions to manage, resulting in moderate impacts. | A critical event requiring extraordinary action, resulting in significant, widespread or long-term impacts. | Disaster with the potential to lead to shut down or collapse of the asset / network, causing significant harm and widespread long-term impacts. |

Source: WSP Physical Climate Change Risk Assessment, as taken from the JASPERS Guidance on the Basics of climate change adaptation, vulnerability and risk assessment.

### Risk scoring

7.2.18 Once the likelihood and severity of potential climate impacts were determined, the CCRA applied a risk matrix to evaluate the overall level of risk as presented in Table 7.3.

**Table 7.3: Risk Matrix**

| Severity          | Likelihood      |              |              |            |                    |
|-------------------|-----------------|--------------|--------------|------------|--------------------|
|                   | Rare (1)        | Unlikely (2) | Possible (3) | Likely (4) | Almost certain (5) |
| Insignificant (1) | 1               | 2            | 3            | 4          | 5                  |
| Minor (2)         | 2               | 4            | 6            | 8          | 10                 |
| Moderate (3)      | 3               | 6            | 9            | 12         | 15                 |
| Major (4)         | 4               | 8            | 12           | 16         | 20                 |
| Catastrophic (5)  | 5               | 10           | 15           | 20         | 25                 |
| Key               |                 |              |              |            |                    |
|                   | Negligible risk | Low risk     | Medium risk  | High risk  | Extreme risk       |

Source: Project Horizon Physical Climate Change Risk Assessment (WSP, 2025)

7.2.19 Risks identified as 'high' or 'extreme' were considered significant and taken forward for additional mitigation to reduce potential impacts.

## Limitations and assumptions

- 7.2.20 The assessment summarised in this chapter is based on the Project Horizon Physical Climate Change Risk Assessment (WSP, 2025). It reflects the methodologies, data sources, and timeframes applied at the time of analysis. As such, the findings and conclusions presented here are dependent on the scope and assumptions of that original assessment. Any updates to climate data, national policy developments, or Project design changes occurring after completion of the CCRA may not be reflected in this summary.
- 7.2.21 The CCRA is based on freely available climate data and information available from third parties for reporting purposes. The following limitations relating to the use of climate projection data should be noted:
- Climate projections are not predictions or forecasts but simulations of potential scenarios of future climate under a range of hypothetical emissions scenarios and assumptions. The results, therefore, from the experiments performed by climate models cannot be treated as exact or factual, but projection options. They represent internally consistent representations of how the climate may evolve in response to a range of potential forcing scenarios and their reliability varies between climate variables.
  - For a single emission scenario, projections can vary significantly as a function of the model used and how it is applied, so that there is a wide uncertainty band in the results. Scenarios exclude outlying 'surprise' or 'disaster' scenarios in the literature and any scenario necessarily includes subjective elements and is open to various interpretations.
  - Further, the degree of uncertainty associated with all climate change projections increases for projections further into the future. Climate models and associated projections are updated on a regular basis, implying changes in the forecasted future climate.
  - Validation of information: No independent verification of the observed or projected data has been undertaken, therefore responsibility or liability for any inaccuracies or shortcomings in this information will not be accepted by the authors. Should these information sources be modified by third parties we assume no responsibility for any of the resulting inaccuracies in any of our reports.

## 7.3 Baseline

### Current baseline

- 7.3.1 This section outlines the current climate conditions in the Almatinskaya Region, where the Project is located. The information is based on long-term baseline data from 1991 - 2020 and provides a snapshot of temperature and precipitation patterns relevant to the area.
- The region experiences a warm to humid continental climate.
  - The average annual temperature over the period 1991-2020 is 7.0°C, with July typically being the hottest month on average (30.6°C) and January the coldest (-15.5°C).
  - The annual average precipitation is 256.4mm, with July being the wettest month (28.3mm), and September the driest (14.2mm).

### Extreme weather events

- 7.3.2 Within the Almatinskaya region several severe and extreme weather events have been reported. In May 2025, forecasts indicated a high fire threat in western and central Almatinskaya with an extremely high fire threat in the northern part of the region. An unprecedented heatwave affected Central Asia in March 2025, with temperatures reaching summer-like highs of 30°C across cities in Kazakhstan, Uzbekistan, Kyrgyzstan, and Turkmenistan.

## Future baseline

7.3.3 The CCRA outlines projected climate trends for the Almatinskaya Region under the high-emissions SSP5-8.5 scenario. These projections are presented across four-time horizons: 2030s (2020–2039); 2050s (2040–2059); 2070s (2060–2079); and 2090s (2080–2099).

7.3.4 The projections are based on a historical baseline (1995–2014). They show the 50th percentile values, with ranges in brackets representing the 10th and 90th percentiles to reflect uncertainty across different climate models.

### Temperature

7.3.5 Temperatures in the Almatinskaya Region are expected to rise significantly over time. Under the SSP5-8.5 scenario, annual average temperatures are projected to increase by 1.3°C in the short term (2030s) and up to 5.7°C by the long term (2090s) relative to the 1995-2014 baseline, based on the 50th percentile of climate model outputs.

7.3.6 The frequency of hot days is also expected to rise:

- Days over 30°C are projected to increase from 45 per year (baseline) to 53 per year by the 2090s.
- Days over 35°C will rise from 12 to 48 per year.
- Days over 40°C, currently rare (0.1 per year), are expected to reach 17 per year.

7.3.7 In contrast, the number of frost days is expected to decline by approximately 46 days per year, reflecting the overall warming trend.

### Precipitation

7.3.8 Annual precipitation in the Almatinskaya Region is projected to increase over time. From a baseline of 432mm, annual average rainfall is expected to increase by 6.8mm by the 2030s and up to 39mm by the 2090s (50<sup>th</sup> percentile).

7.3.9 Seasonal averages show contrasting changes:

- Average summer precipitation is projected to decrease by 15mm by the 2090s.
- Average winter precipitation is projected to increase by 31mm over the same period.

In addition to overall changes in precipitation patterns, projections indicate an increase in intensity, with more frequent extreme rainfall events. Notably, both 1-day and 5-day rainfall totals are expected to rise. This is particularly relevant given the significant pluvial flooding event that occurred at Almaty International Airport (ALA) on 16 July 2024, which exposed vulnerabilities in the original drainage design<sup>9</sup>.

### Relative humidity

7.3.10 Relative humidity levels in the Almatinskaya Region are projected to decline gradually over time. By the 2090s, reductions of approximately 3.4% in summer and 2.7% in winter are expected (50th percentile), indicating a consistent downward trend across seasons.

### Wind

7.3.11 Future changes in wind speed for the Almatinskaya Region are subject to high uncertainty due to natural climate variability and limitations in regional climate models. According to data from

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<sup>9</sup> ALA (2025) The Lenders ES Monitoring Report – RFI030-031-032



the Copernicus Interactive Climate Atlas, the average daily wind speed over the period 1950-2020 in Kazakhstan was 3.5 m/s<sup>10</sup>.

- 7.3.12 Projections under the SSP5-8.5 scenario suggest minimal change in average daily wind speeds across the short-, medium-, and long-term timeframes, with a slight decrease of 0.1 m/s (50th percentile). While these projections do not indicate significant changes in average wind speeds, they do not rule out the possibility of extreme wind events, although Almaty City is not typically exposed to severe storms such as cyclones or hurricanes.

#### **Wildfire**

- 7.3.13 The wildfire hazard risk in Almaty City is classified as 'High', meaning there is a greater than 50% chance each year of experiencing weather conditions that could support a significant wildfire, potentially resulting in loss of life and property.
- 7.3.14 With the influence of climate change, this risk is projected to increase over time, driven by both a longer fire season and greater severity fire events<sup>11</sup>.

#### **Flood risk**

- 7.3.15 The river and urban flood risk in Almaty City is currently classified as 'Very Low', meaning there is less than a 1% chance of a significant, life-threatening river flood occurring in the next 10 years.<sup>11</sup> The Malaya Almatinka River, located about 50m west of the site and 20m below airport elevation, and the Kotyrbulak River, culverted beneath the runways, pose minimal fluvial flood risk, with no known history of flooding at the site<sup>12</sup>.
- 7.3.16 However, future flood risk may increase in the short- and medium-term due to rising winter and annual precipitation and glacial melt, which feeds into nearby river systems. In the long-term, this risk reduces as glacial retreat may reduce river flow.
- 7.3.17 In the Almaty region, extensive efforts have been made to mitigate the growing flood risk associated with glacial melt<sup>13</sup>. These efforts are driven by the increasing formation and expansion of moraine-dammed glacial lakes due to climate-induced glacier retreat, which pose a significant hazard to downstream communities. Structural measures have been implemented, including the construction of spillways, drainage tunnels, and diversion canals to manage lake water levels and reduce the risk of sudden outbursts. These engineering solutions are complemented by non-structural strategies such as hazard and risk mapping, strategic land-use planning, and community-based disaster preparedness programmes.
- 7.3.18 Conversely, the risk of pluvial flooding may increase, especially in winter months due to increased precipitation, and in summer due to hardened ground from dry spells, which can lead to flash flooding during heavy downpours.

#### **Landslide**

- 7.3.19 Landslide risk in Almaty City is currently classified as 'Medium'<sup>11</sup>, meaning landslides are infrequent but possible, influenced by factors such as rainfall patterns, terrain slope, geology, soil type, and land cover.

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<sup>10</sup> Copernicus Climate Change Service (2024) Copernicus Interactive Climate Atlas. Available at: [Copernicus Interactive Climate Atlas](#) (accessed: September 2025)

<sup>11</sup> Global Facility for Disaster Reduction and Recovery (GFDRR) (2020) Think Hazard. Available at: [Think Hazard](#) (accessed: September 2025)

<sup>12</sup> Geographical Research Letters (2025) Almaty Topographic Map. Available at: <https://en-gb.topographic-map.com/map-5cg14/Almaty/>. (accessed July 2025)

<sup>13</sup> Ahmed, R. (2024) Glacial Lake Outburst Flood (GLOF) Hazard and Risk Management Strategies: A Global Overview. [online] Available at: [Glacial Lake Outburst Flood \(GLOF\) Hazard and Risk Management Strategies: A Global Overview | Water Resources Management](#) (last accessed: August 2025)

- 7.3.20 With climate change, this risk may increase over time due to potential changes in precipitation and temperature, which can affect slope and bedrock stability.

#### **Exposure appraisal**

- 7.3.21 Based on the exposure appraisal as indicated in the Project Horizon CCRA, the Project components may be significantly impacted by the following climate hazards:

- High temperatures and heatwaves
- Cold spells
- Heavy precipitation and flooding
- Dry spells and water availability
- Decreasing relative humidity
- Wind and storm events
- Wildfire
- Changes in ground stability

## **7.4 Potential impacts**

- 7.4.1 This section assesses the potential impacts of climate change on the operational phase of the Project. As noted in paragraph 7.1.3, the construction phase has been scoped out of this assessment. This is because construction is expected to be completed by 2028 and will therefore be subject to current climate conditions, rather than future climate change impacts.

### **Operation**

#### **Temperature**

- 7.4.2 High temperatures may lead to surface degradation in hardstanding areas such as taxiways, runways, aprons, and parking stands. This includes risks of melting, cracking, and accelerated wear.
- 7.4.3 Extreme weather conditions may increase pressure in stored liquids and elevate fire risks within fuel storage systems. Snow and ice accumulation also pose risks to aboveground pipework and pumping equipment, potentially leading to damage or operational disruption.
- 7.4.4 Cold weather events, including ice, snow, and freezing fog, have the potential to disrupt airport operations, affecting both ground and airside activities.
- 7.4.5 Buildings and occupants may be affected by temperature extremes, which can accelerate material degradation and increase health and safety risks, particularly during heatwaves or cold spells.
- 7.4.6 Vegetated areas may deteriorate under extreme heat conditions, impacting their usability, visual quality, and maintenance requirements.

#### **Increasing precipitation and flooding**

- 7.4.7 There is a potential impact of drainage infrastructure overwhelm due to increased annual and winter precipitation, which could result in standing water; damage to infrastructure and buildings; spread of pollutants and access and egress disruptions.

#### **Wind and storms**

- 7.4.8 There is the potential for damage from wind-blown debris to impact the equipment at the de-icing pad and fuel farm, as well as buildings, which may require appropriate design and maintenance measures.

### **Wildfire**

- 7.4.9 All components of the Project may be exposed to wildfire risk, which poses a potential threat to both infrastructure and safety. While the likelihood of such events may vary, their occurrence could result in significant disruption and damage.

### **Ground stability**

- 7.4.10 Hardstanding surfaces and building foundations may be affected by ground movement resulting from prolonged wet or dry periods, combined with temperature extremes. These conditions can lead to subsidence, cracking, or frost-related damage due to changes in soil stability and moisture content.
- 7.4.11 Based on the assessment, several components of the Project are potentially subject to significant climate-related impacts. These are summarised below and should be considered in the context of long-term resilience planning and design adaptation.
- All Project components (excluding drainage and wastewater treatment) in relation to high temperatures, heatwaves, and cold spells.
  - All Project components in relation to heavy precipitation and flooding.
  - The fuel farm and new buildings, in relation to wind and storm events.
  - The fuel farm in relation to wildfire.
  - The taxiway, and main runway in relation to changes in ground stability.

## **7.5 Assessment of effects**

- 7.5.1 This section outlines the potential climate-related effects on the Project's operational phase across four future time horizons: 2030s, 2050s, 2070s, and 2090s. Risks have been assessed based on projected climate hazards and their potential impact on infrastructure, operations, and safety.

### **Operational phase effects**

#### **Short term (2030s)**

- 7.5.2 Risks for the 2030s are rated as Negligible, Low, or Medium, with no additional adaptation measures required at this stage.
- 7.5.3 The identified Medium (4) risks included:
- Increasing temperatures and heatwaves leading to overheating in buildings, affecting comfort and health.
  - Cold spells and snow and ice leading to access and egress issues.

#### **Medium term (2050s)**

- 7.5.4 Two High risks were identified, both related to overheating in new buildings due to rising temperatures.
- 7.5.5 The identified Medium risks (9) included:
- Temperature extremes leading to deformation of taxiways/runways.
  - Pluvial flooding and standing water affecting airport operations.
  - Heavy rainfall and flooding leading to overwhelm of drainage systems.
  - Increasing temperatures and heatwaves leading to increased cooling demand for buildings.
  - Cold spells with snow and ice-related access issues.

### Medium term (2070s)

- 7.5.6 The same two High risks identified in the 2050s remain relevant for the 2070s period.
- 7.5.7 The number of Medium risks increase to 35, reflecting greater exposure to climate hazards over time.

### Long term (2090s)

- 7.5.8 Three High risks are identified, consistent with those outlined in earlier time horizons.
- 7.5.9 The number of Medium risks increase to 39, including:
- Increased temperatures and heatwaves leading to surface deformation of aprons, parking stands, and de-icing areas.
  - Increased temperatures and heatwaves leading to overheating and equipment failure within parking and apron stands.
- 7.5.10 In line with the methodology and as outlined in paragraph 7.2.18, risks assessed as 'high' or 'extreme' within the 2090s time horizon are considered significant. No *Extreme* risks were identified.
- 7.5.11 Risk scores account for embedded design measures identified at the current design stage and standard good practice operational measures.
- 7.5.12 Three *High* risks considered significant for the 2090s include:
- **(Risk score – 15)** High temperatures and heatwaves leading to overheating of buildings (new buildings) resulting in uncomfortable working conditions and health impacts;
  - **(Risk score – 15)** High temperatures and heatwaves leading to overheating of buildings, resulting in uncomfortable working/amenity conditions and health impacts; and
  - **(Risk score – 12)** High temperatures and heatwaves leading to deformation of taxiway or runway impeding airport operations.

## 7.6 Additional mitigation

- 7.6.1 This section summarises additional mitigation measures for the three climate-related risks considered significant to the Project. These measures aim to enhance resilience and reduce potential impacts associated with overheating and surface deformation under future climate scenarios.
- 7.6.2 As the design of the Project components progresses, projected climate trends should be integrated into the design process to manage risks such as overheating. Measures include:
- Incorporate nature-based solutions (NbS) for shading and cooling.
  - Use natural or mechanical ventilation and cooling systems.
  - Specify appropriate glazing and install awnings, canopies, shutters, or blinds to reduce solar gain.
- 7.6.3 For the third high risk, relating to high temperatures and heatwaves leading to deformation of taxiway or runway, impeding operations, the following additional mitigation measures are identified:
- Regular inspection and monitoring of taxiways and runways should be carried out to identify early signs of surface degradation.
  - If any issues are detected, prompt and effective repair works should be undertaken to prevent further deterioration and extend the lifespan of the pavement infrastructure.

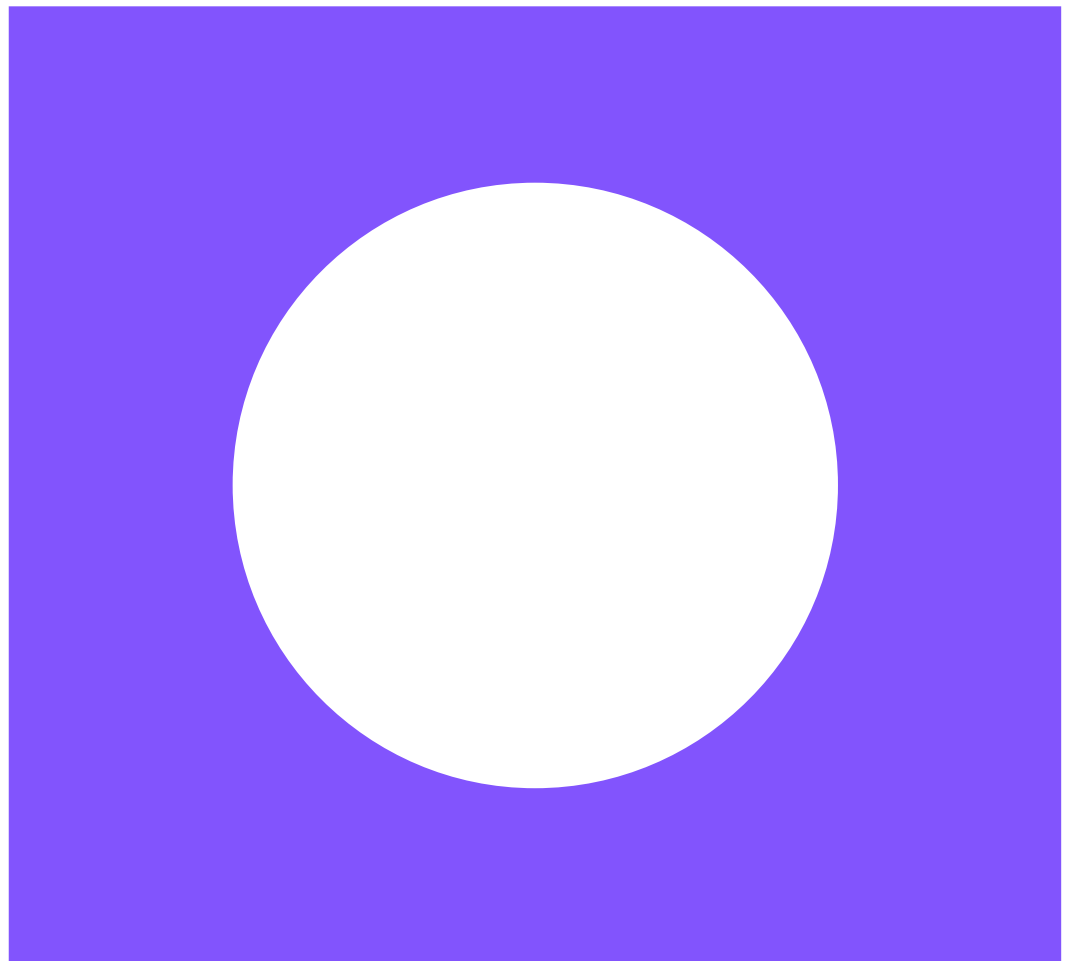
7.6.4 The following additional mitigation measure is identified as part of this ESIA, and is committed to by ALA, applicable across a range of risks:

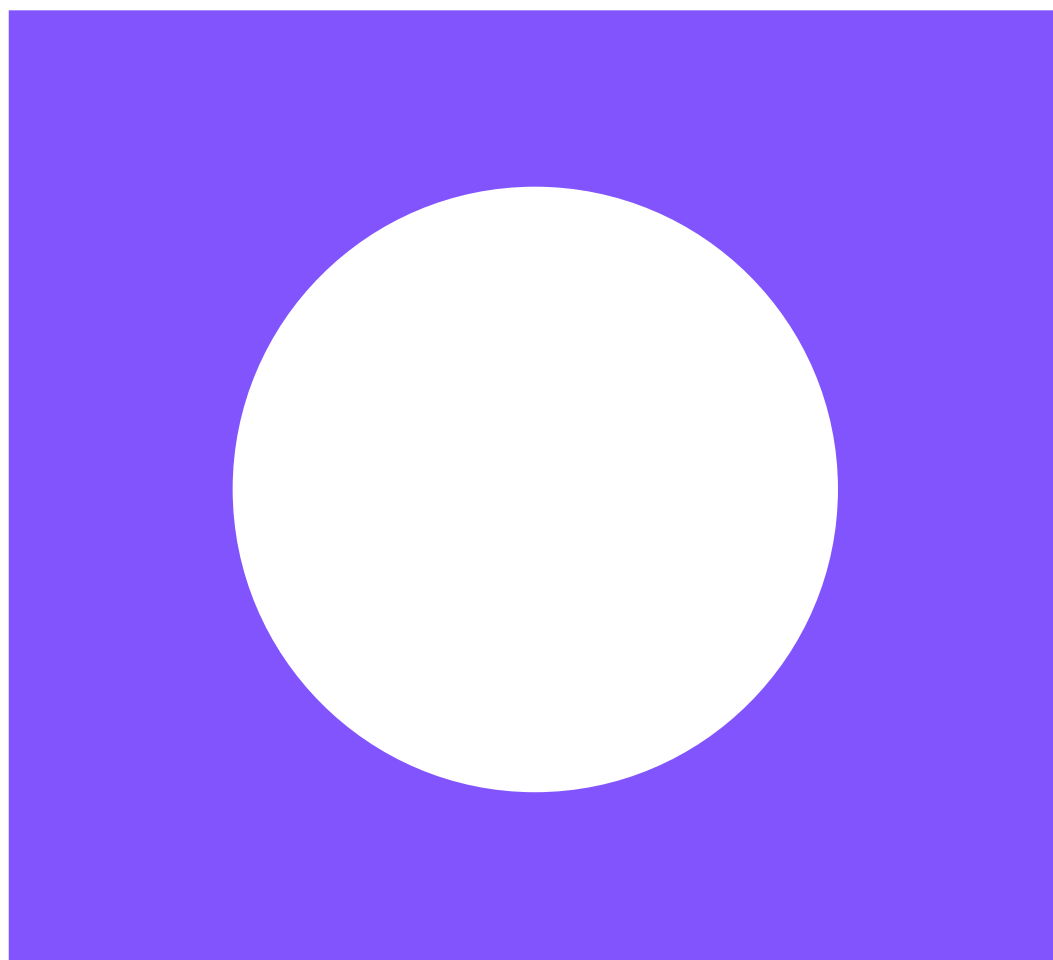
- Update the Environmental and Social Management Plan (ESMP) to include a dedicated Extreme Weather Management Plan (EWMP). The EWMP should include protocols for:
  - Real-time rainfall monitoring
  - Flood risk mapping and infrastructure resilience assessments
  - Emergency response coordination
  - Preventative schedules for drainage systems
  - Contingency plans for prolonged or high-intensity rainfall events
  - Communication strategies and stakeholder coordination (e.g. air traffic control, emergency services)
  - Integration with broader airport emergency response frameworks.

## 7.7 Summary of residual effects

7.7.1 Following the application of mitigation measures proposed within Section 7.6, it is concluded that there will be no significant residual effects for the operational phase of the Project.

7.7.2 The recommended interventions are likely to effectively reduce potential impacts to a level that is not considered significant. Ongoing monitoring and adaptive management will ensure that any unforeseen effects are promptly identified and addressed, further supporting the conclusion of no significant residual effects.





# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 8

October 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 8**

October 2025

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# Contents

|                                                                                                                     |    |
|---------------------------------------------------------------------------------------------------------------------|----|
| Acronyms and abbreviations                                                                                          | 1  |
| 8 Community                                                                                                         | 2  |
| 8.1 Introduction                                                                                                    | 2  |
| 8.2 Methodology                                                                                                     | 2  |
| Applicable guidelines and standards                                                                                 | 2  |
| Area of Influence for the SIA                                                                                       | 2  |
| Methodological approach                                                                                             | 4  |
| Data collection                                                                                                     | 5  |
| Limitations and assumptions                                                                                         | 10 |
| 8.3 Baseline                                                                                                        | 10 |
| Current baseline                                                                                                    | 10 |
| Future baseline                                                                                                     | 30 |
| 8.4 Potential impacts                                                                                               | 30 |
| 8.5 Assessment of effects                                                                                           | 31 |
| Construction phase effects                                                                                          | 31 |
| Operational phase effects                                                                                           | 33 |
| 8.6 Mitigation                                                                                                      | 38 |
| Construction management                                                                                             | 38 |
| Operational mitigation                                                                                              | 41 |
| 8.7 Summary of residual effects                                                                                     | 45 |
| Appendix 8.A: Hand brochure                                                                                         | 49 |
| Appendix 8.B: NIP Leaflet                                                                                           | 51 |
| Tables                                                                                                              |    |
| Table 8.1: SIA sensitivity criteria                                                                                 | 4  |
| Table 8.2: SIA magnitude criteria                                                                                   | 4  |
| Table 8.3: Zone A survey responses                                                                                  | 7  |
| Table 8.4: Zone B survey responses                                                                                  | 8  |
| Table 8.5: Total population of Almaty City, Almaty District, Turksib District, and Talgar District in 2025          | 13 |
| Table 8.6: Buildings affected by noise levels (dB(A)), differentiated by day and night, for the years 2025 and 2030 | 15 |
| Table 8.7: General RoK aviation safety restrictions                                                                 | 29 |
| Table 8.8: Summary of residual effects for community                                                                | 46 |

## Figures

|                                                                                                                                                                                                                     |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 8.1: Almaty Airport 1.5km area around the Almaty Airport by neighbourhood                                                                                                                                    | 3  |
| Figure 8.2: Zone A and Zone B survey subzone areas                                                                                                                                                                  | 6  |
| Figure 8.3: Zone A Surveys heat map                                                                                                                                                                                 | 8  |
| Figure 8.4: Zone B heat map                                                                                                                                                                                         | 9  |
| Figure 8.5: Almaty City districts                                                                                                                                                                                   | 11 |
| Figure 8.6: Cadastral map of land use for the direct area of influence (2021)                                                                                                                                       | 14 |
| Figure 8.7: Location of affected buildings by noise, 2025                                                                                                                                                           | 15 |
| Figure 8.8: Location of affected buildings by noise, 2030                                                                                                                                                           | 15 |
| Figure 8.9: Commercial establishments                                                                                                                                                                               | 19 |
| Figure 8.10: Community facilities                                                                                                                                                                                   | 20 |
| Figure 8.11: Distribution of female individuals who perceive that their health has been adversely impacted by exposure to airport noise (size of circle indicates number of individuals who responded in that area) | 25 |
| Figure 8.12: Distribution of male individuals who perceive that their health has been adversely impacted by exposure to airport noise (size of circle indicates number of individuals who responded in that area)   | 25 |
| Figure 8.13: Health effects attributed to exposure to airport noise                                                                                                                                                 | 26 |
| Figure 8.14: Distances from the airport                                                                                                                                                                             | 28 |
| Figure 8.15: Comparison of Lnight > 60 dB(A) for Project Scenarios                                                                                                                                                  | 35 |
| Figure 8.16: Community facilities affected by noise in 2030                                                                                                                                                         | 36 |

# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                                               |
|------------------------|--------------------------------------------------------------------------|
| AAK                    | Aviation Administration of Kazakhstan                                    |
| ALA                    | Almaty International Airport                                             |
| ASZ                    | Aviation Safety Zone                                                     |
| BAKAD                  | Big Almaty Ring Road                                                     |
| CESMP                  | Construction Environmental and Social Management Plan                    |
| CLO                    | Community Liaison Officer                                                |
| CSR                    | Corporate Social Responsibility                                          |
| dB(A)                  | Decibels adjusted for human hearing sensitivity                          |
| E&S                    | Environmental and Social                                                 |
| EBPD                   | European Bank for Reconstruction and Development                         |
| EHS                    | Environmental, Health, and Safety                                        |
| EPC                    | Engineering, Procurement and Construction (EPC) Contractor               |
| EPRP                   | Emergency and Preparedness Response Plan                                 |
| ESMP                   | Environmental and Social Management Plan                                 |
| FAQ                    | Frequently asked questions                                               |
| GDP                    | Gross Domestic Product                                                   |
| GPS                    | Global Position System                                                   |
| IAC                    | Interstate Aviation Committee                                            |
| ICAO                   | International Civil Aviation Organisation                                |
| IFC                    | International Finance Corporation                                        |
| KIIs                   | Key Informants Interviews                                                |
| L&FS                   | Life and Fire Safety                                                     |
| NIP                    | Noise Insulation Programme                                               |
| NMP                    | Noise Management Plan                                                    |
| PSZ                    | Public Safety Zone                                                       |
| RANCH                  | Road Traffic and Aircraft Noise Exposure and Children's Cognitive Health |
| RoK                    | Republic of Kazakhstan                                                   |
| SEP                    | Stakeholder Engagement Plan                                              |
| SIA                    | Social Impact Assessment                                                 |
| SME                    | Small and Medium-sized Enterprise                                        |
| SPZ                    | Sanitary Protection Zone                                                 |
| UNDP                   | United Nations Development Programme                                     |
| WBG                    | World Bank Group                                                         |

## 8 Community

### 8.1 Introduction

- 8.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) presents the baseline description of the community context and reports the findings of an assessment of the potential impacts on, and risks to, community as a result of the Project. The assessment has considered who will be impacted and how for the construction and operational phases. Management measures (mitigation, enhancement and monitoring) have been identified for the impacts and risks. This chapter focuses on how local communities may be affected as a result of the Project in terms of the way they live, travel and interact with one another on a day-to-day basis.

### 8.2 Methodology

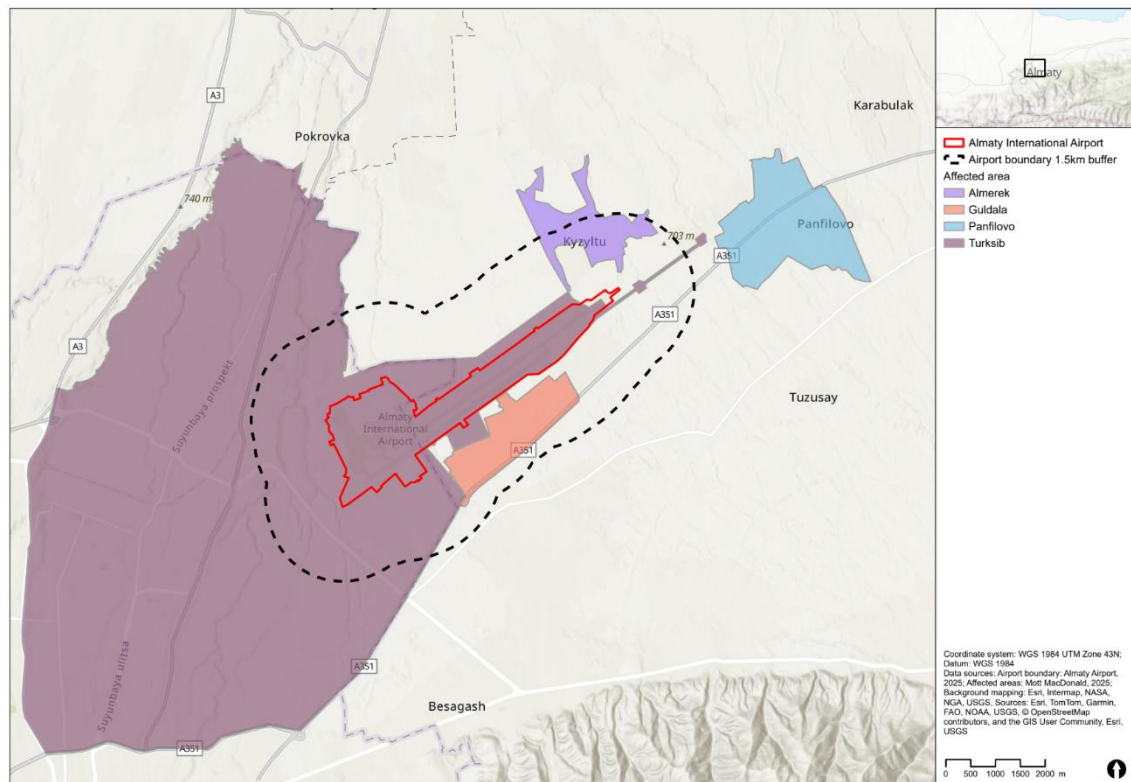
#### Applicable guidelines and standards

- 8.2.1 The applicable standards that influence the Social Impact Assessment (SIA) include the legal framework of Kazakhstan and the International Finance Corporation (IFC) and the European Bank for Reconstruction and Development (EBRD) international performance standards and requirements related to:
- Assessment and management of environmental and social risks and impacts
  - Community health, safety, and security
  - Land acquisition, restrictions on land use and involuntary
  - Stakeholder engagement
  - Vulnerability risk assessment
- 8.2.2 Good international industry practice (GIIP) and requirements by IFC and EBRD related to labour management and working conditions are covered in the **ESIA Chapter 15: Workers**. Groups who meet the prospective Lenders' criteria for Indigenous Peoples have not been identified in the Project area. **ESIA Chapter 3: Policy, legal and institutional framework** provides more details on these standards and requirements.

#### Area of Influence for the SIA

- 8.2.3 For this assessment, two areas of influence were defined as part of our methodology based on the likelihood of Project impacts materialising:
1. **Direct area of influence:** Figure 8.1 shows this area using a 1.5km buffer from the airport boundary and the affected communities identified in the noise modelling map. Within this area, certain negative impacts, such as noise disturbance, are already being experienced and are expected to intensify as a result of the Project's development.
  2. **Indirect area of influence:** This encompasses Almaty City and Almaty Region, which are also anticipated to experience Project-related impacts, particularly of an economic nature.

**Figure 8.1: Almaty Airport 1.5km area around the Almaty Airport by neighbourhood**



Source: Mott MacDonald, July 2025

8.2.4 In relation to the direct area of influence, two zones, Zone A and Zone B, were identified within this area based on the noise modelling data provided by Frekans in June 2025. Although the noise will disperse to different intensities within these specific locations, this helps depict the areas most likely to be affected by noise, for the purposes of defining the study areas. The decibels (dB) audible to humans (A) framework that Frekans applied was the following:

- Daytime
  - 55 dB(A) Leq outdoors – based on the National Standard, IFC/ World Bank Group (WBG) guidelines and World Health Organisation (WHO) standards; represents the average noise level during daytime
  - 70 dB(A) LA (max) outdoors – from the National Standard; applies to single noise events caused by aircraft
- Night-time
  - 45 dB(A) Leq outdoors – based on the National Standard, IFC/WBG guidelines and WHO standards; represents the average noise level during night-time
  - 60 dB(A) LA (max) outdoors – from the National Standard; applies to single noise events caused by aircraft

8.2.5 In light of the above, 60 dB LA (max) night-time was the reference taken to set the different zones to collect the primary data. Zone A includes those areas already affected by noise levels over 60 dB LA (max) night-time. Zone B areas are those already affected by noise levels that are less than 60 dB LA (max) night-time. These zones were selected for the collection of primary data (refer to Section 'Primary data collection' for further details) and correspond to the neighbourhoods of Turksib, Guldala, Almerek and Panfilovo.

- 8.2.6 In Figure 8.1, Panfilovo is visibly outside the 1.5km area, but it is still relevant due to its location with regards to the runway, since airplanes fly over the neighbourhood when landing and taking off, thus being exposed to noise over 60 dB LA(max) night-time. The neighbourhood of Nurshashkan, west of Guldala within the direct affected area, is adjacent to the main road to the airport and is discussed further in the **ESIA Chapter 12: Traffic and transport**.
- 8.2.7 Given the small size of the units selected within the direct area of influence, Talgar District and Almaty City will be used as reference areas when specific data is unavailable. Talgar District encompasses the settlements of Guldala, Almerrek, and Panfilovo, while Turksib is situated within Almaty City.

## Methodological approach

- 8.2.8 **ESIA Chapter 4: ESIA scope and methodology** presents the assessment methodology. For the SIA, the significance of social effects is determined through consideration of the level of vulnerability (sensitivity) of Project affected individuals, households, communities, and other social groups, and the magnitude of the impact experienced by them. For the purpose of this study, people who are vulnerable are considered to be those who receive government support and those with illnesses, poor house conditions, households with large number of dependence such as elderly people and children, and those living in poverty. The sensitivity criteria used in this SIA is presented in Table 8.1.

**Table 8.1: SIA sensitivity criteria**

| Categorisation | Definition                                                                                                                                                                        |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High           | People who are already vulnerable with very little capacity and means to absorb proposed changes or with very little access to alternative similar resources, sites, or services. |
| Medium         | People who are already vulnerable with limited capacity and means to absorb proposed changes or with some access to alternative similar resources, sites, or services.            |
| Low            | People who are not vulnerable with some capacity and means to absorb proposed changes and with some access to alternative similar resources, sites, or services.                  |
| Negligible     | People who are not vulnerable with plentiful capacity and means to absorb proposed changes and with good access to alternative similar resources, sites, or services.             |

Source: Mott MacDonald

- 8.2.9 The magnitude of the social impacts is determined by consideration of the extent to which people gain or lose access to, or control over, socio-economic resources, resulting in a beneficial or adverse effect on their individual and collective wellbeing. Wellbeing is considered as the financial, physical, and emotional conditions and quality of life of people and communities. Refer to Table 8.2 for the impact magnitude criteria used for the SIA.

**Table 8.2: SIA magnitude criteria**

| Categorisation | Definition                                                                                                                                                                                                                                    |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Major          | An impact that would have permanent implications for the long term affecting the wellbeing of many people across a broad cross-section of the population and affecting various elements of the local communities' and/or workers' resilience. |
| Moderate       | An impact that continues for the medium/non-permanent term throughout the Project life and affects the wellbeing of specific groups of people and affecting specific elements of the local communities' and/or workers' resilience.           |
| Minor          | An impact that occurs periodically or over the short term throughout the life of the Project affecting the wellbeing of a small number of people and with little effect on the local communities' and/or workers' resilience.                 |
| Negligible     | A potential impact that is very short in duration so that the socio-economic baseline remains largely consistent and there is no detectable effect on the wellbeing of people or the local communities' and/or workers' resilience.           |



Source: Mott MacDonald

- 8.2.10 As discussed in **ESIA Chapter 4: ESIA scope and methodology**, people's sensitivity is integrated with impact magnitude to determine the attribution of significance to effects.
- 8.2.11 For the purpose of this ESIA, an impact is an economic, social, environmental, and other consequence that can be reasonably foreseen and measured in advance if a proposed action, such as project construction, is implemented. In contrast, a risk is an uncertain event of unknown probability. For instance, in this ESIA, health and safety events are risks not impacts. If an injury or a spill was predicted as an impact, then many projects would not receive approval or proceed, however risks need to be mitigated from occurrence. Following the identification of potential impacts, associated risks are evaluated taking into account the baseline characterisations. Significance is not attributed to the risks, but management measures are identified. The risks are associated with both the construction and operational phases of the Project.

## Data collection

- 8.2.12 The SIA uses both primary and secondary data sources to provide a comprehensive description of the social context and baseline characterisation. The next sections describe the data sources.

## Primary data collection

- 8.2.13 Three methods were employed to collect data: household surveys, key informant interviews, and community mapping. The areas selected to collect the data were the neighbourhoods of Turksib, Guldala, Almerek and Panfilovo due to the current and projected noise impact, once the Project starts its operational phase.

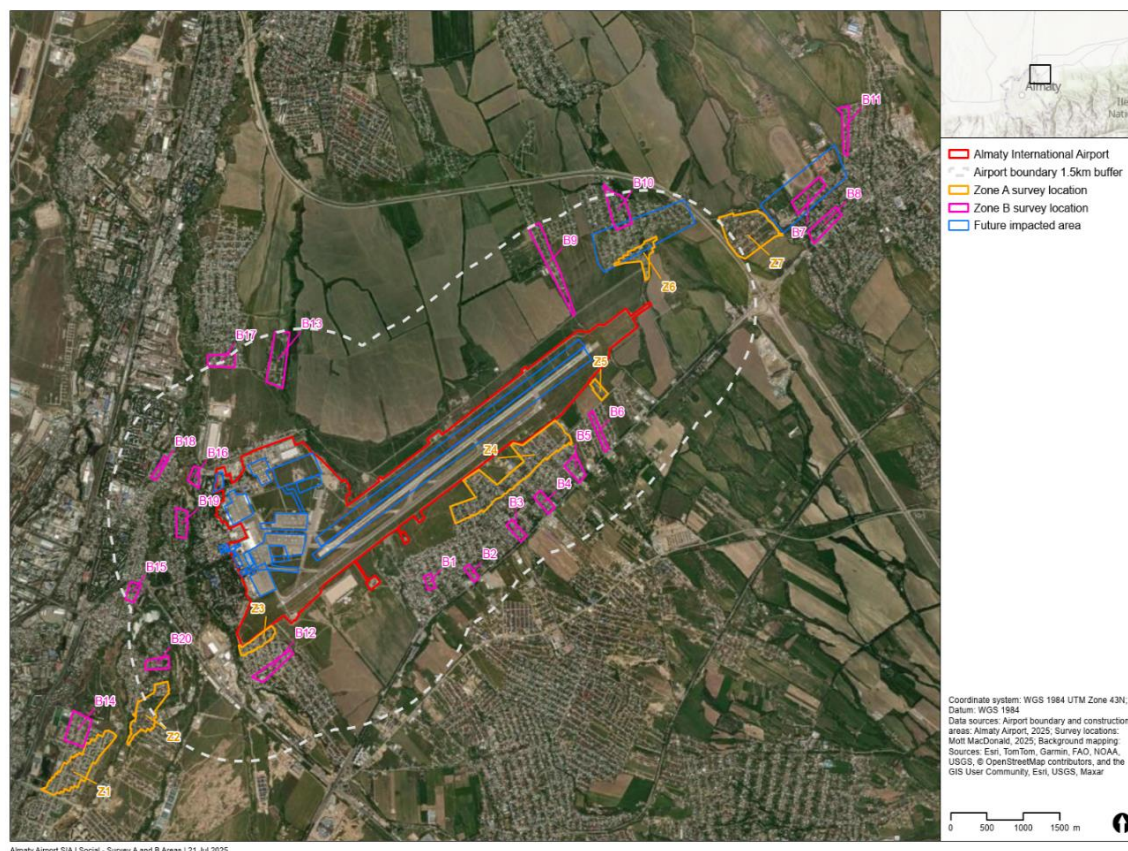
### Household surveys

- 8.2.14 Two household surveys were designed to cover areas impacted by noise. Initially, the plan was to conduct one comprehensive survey accompanied by a series of focus group discussions. However, following requests from the district akimats<sup>1</sup>, the focus groups were replaced with a shorter, second survey. Ultimately, two distinct surveys were selected as the primary data collection method.
- 8.2.15 The Zone A Survey (Survey A) was designed to cover seven subzones where noise levels are known to currently exceeded 60 dB LA (max) night-time. The Zone B Survey (Survey B) targeted 20 locations in areas affected by noise levels below 60 dB LA (max) night-time. Figure 8.2 shows where the two surveys were administered. Each property where an interview was attempted or undertaken was identified by using a specific code, determined by the subzone in which the interview was conducted. The target sample sizes were 320 responses for Survey A and 160 responses for Survey B. Survey A commenced on 28 June 2025 and concluded on 16 July 2025 with 430 responses being recorded, including 213 women. Survey B began on 15 July and ended on 18 July 2025.

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<sup>1</sup> In Kazakhstan, the akimat serves as the primary executive body in each region, with the akim functioning as the equivalent of a mayor.

**Figure 8.2: Zone A and Zone B survey subzone areas**



Source: Mott MacDonald, July 2025

- 8.2.16 Survey teams were deployed in pairs. As a token of appreciation, tea packets were distributed to participants of Survey A. As Survey B required fewer resources, it was initially decided that no gifts would be distributed to participants. However, due to a surplus of tea packs, gifts were ultimately provided to Survey B respondents.
- 8.2.17 The surveyors received training which covered data collection procedures for Surveys A and B, use of the Survey123 app, data protection protocols, health and safety measures during fieldwork, and other relevant topics. Two of the sociologists were consistently involved throughout the process, while the other two participated as their availability allowed. The field supervisor was responsible for transporting various materials, including hand brochures (Appendix 8.A: Hand brochure), health and safety equipment, and the storage of the tea packs bought as gifts intended for participating households. When necessary, the field supervisor also conducted surveys directly. health and safety equipment, and the storage of the tea packs bought as gifts intended for participating households. When necessary, the field supervisor also conducted surveys directly.
- 8.2.18 Several supporting documents were prepared and translated into Kazakh and Russian for the fieldwork, including:
- A surveyors' guidance document, providing instructions and clarifications to assist surveyors in conducting the survey appropriately, particularly in cases of uncertainty.
  - An authorisation letter signed by Almaty International Airport (ALA), legitimising the role of the surveyors.

- A consent script for surveyors to read aloud, informing respondents of the survey's purpose and the intended use of their data.
- An informational handout to be left at properties (refer to Appendix 8.A: Hand brochure) outlining the development programme, its rationale, and providing contact details for the Community Liaison Officer (CLO) and the grievance mechanism.
- Notification text to inform how to contact the survey team to be left at properties in cases where residents are absent at the time of the visit.
- Frequently asked questions (FAQs) to help surveyors respond in a standard manner to questions. FAQs could be added to the list as the surveys progressed and new questions were identified.
- The Noise Insulation Programme (NIP) brochure (refer to Appendix 8.B: NIP Leaflet), which explained the programme and how affected households could access it. This was meant to be given only in Guldala, where ALA has selected to implement the NIP.

**Zone A Survey – Properties currently affected by 60 dB LA (max) night-time (according to 2025 noise modelling)**

8.2.19 The Zone A Survey covered seven survey sub-zones (refer to Figure 8.2) across four neighbourhoods - Turksib, Guldala, Almerék, and Panfilovo - which were identified as currently experiencing noise levels exceeding 60 dB(A) LA (max) night-time. This survey was designed to be more comprehensive and detailed than the Zone B survey. It is structured into sections of varying length, covering Respondent details, demographic profile of property residents, vulnerability, perception of ongoing noise from the airport, perception of Project impacts, and structure materials. A total of 430 households agreed to participate in the survey. Table 8.3 presents the survey coverage.

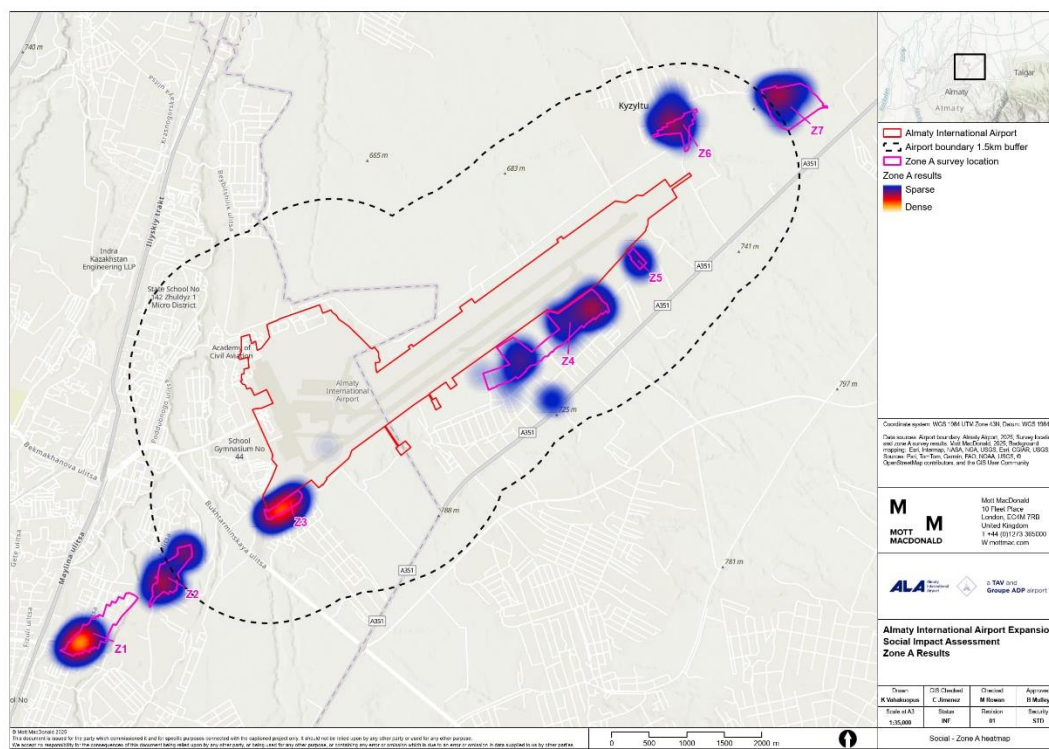
**Table 8.3: Zone A survey responses**

| Location  | Surveys completed | Refusals to participate |
|-----------|-------------------|-------------------------|
| Turksib   | 224               | 12                      |
| Guldala   | 106               | 3                       |
| Almerék   | 50                | 0                       |
| Panfilovo | 50                | 0                       |
| Total     | 430               | 15                      |

Source: Mott MacDonald, 2025

8.2.20 For this survey, several households included babies or children under the age of 10. However, many responses about young household members were not recorded, as families were uncomfortable providing information about minors. A total of 58 respondents were over the age of 65, and 53 reported having at least one household member aged 65 or older. Of those interviewed, only five respondents reported working night shifts.

**Figure 8.3: Zone A Surveys heat map<sup>2</sup>**



Source: Mott MacDonald, 2025

- 8.2.21 As illustrated in Figure 8.3, the majority of surveys were conducted in Zone A sub-zone 1 of the Turksib district, followed by sub-zone 3. Among the neighbourhoods, Guldala was the most represented, followed by Almerek and Panfilovo.

#### **Zone B Survey - Properties predicted to be affected by noise under 60 dB LA (max) night-time (according to 2025 noise modelling)**

- 8.2.22 This survey was implemented after Zone A survey in areas less affected by noise. The survey was also shorter than the Zone A survey covering respondent details, perceived role of the airport, and vulnerability and noise impacts. Twenty locations were selected, with eight surveys to be taken at each, for a target of 160 completed surveys. This task was carried out by two surveyors.

**Table 8.4: Zone B survey responses**

| Location  | Surveys completed | Refusals to participate |
|-----------|-------------------|-------------------------|
| Turksib   | 72                | 0                       |
| Guldala   | 40                | 3                       |
| Almerek   | 16                | 0                       |
| Panfilovo | 25                | 0                       |

<sup>2</sup> A heat map is a visual representation of data where individual values are represented by colours. In the context of survey data collected by zones, the heat map is used to show the number of surveys collected in each zone, with different colours indicating different levels of survey activity. Darker or warmer colours (like red or orange) indicate zones with higher numbers of surveys. Lighter or cooler colours (like blue) indicate zones with fewer surveys.

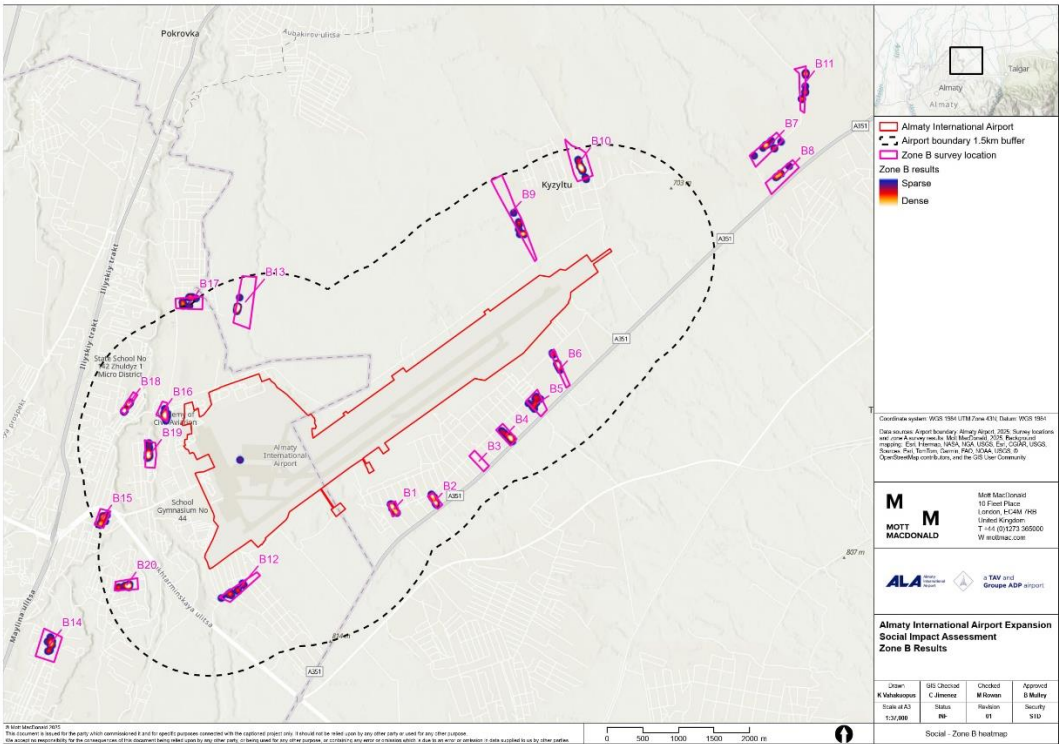


| Location | Surveys completed | Refusals to participate |
|----------|-------------------|-------------------------|
| Total    | 153               | 3                       |

Source: Mott MacDonald, 2025

8.2.23 Due to a misunderstanding among the surveyors, seven surveys in one sub-zone were completed using the Survey A questionnaire instead of the intended format. As a result, sub-zone B3 (refer to Figure 8.4) appears blank. The data recorded in this sub-zone has been analysed under Survey A. Figure 8.4 shows where the Zone B surveys were undertaken. The areas outside the 1.5km area are along take-off and landing routes for the new runway which is part of the Project.

Figure 8.4: Zone B heat map



Source: Mott MacDonald, 2025

Key informants' interviews (KIs)

8.2.24 As an additional source of primary data collection, twelve key informants' interviews (KIs) were planned. Informants were selected from within the area of influence and included governmental representatives such as the akimats, heads of police departments, school principals, chief medical officers, and other relevant stakeholders.

8.2.25 The interviews commenced during the week of 14 July 2025.

Community mapping

8.2.26 The final method used to gather primary data was community mapping. This activity aimed to identify community-use infrastructure that is both significant to local residents and situated in areas currently affected by, or expected to be impacted by, noise. The list of features to be identified included: colleges, hospitals, graveyards, kindergartens, mosques, parking areas, pharmacies, places of worship, police stations, schools, universities, restaurants or cafés, and

any other relevant facilities specified during the mapping process. Four walking areas were designated in the neighbourhoods of Turksib, Guldala, Almerék, and Panfilovo to collect this information. The community mapping was undertaken using the ESRI FieldMaps<sup>3</sup> application. Community mapping commenced on 10 July and concluded on 18 July 2025.

### Secondary data collection

- 8.2.27 Secondary data was collected through internet-based research, including a review of academic literature and statistical information from the Bureau of Statistics of Kazakhstan and online house registry data<sup>4</sup>. Additionally, we received relevant documentation from ALA concerning community characteristics, engagement activities conducted and grievances raised by residents.

### Limitations and assumptions

- 8.2.28 The survey respondents were selected by their location based on initial noise modelling. The residential areas around the airport have grown since the 2022 ESIA. As such it was not possible to undertake surveys in all of them. The agreed methodological approach was to focus on the four neighbourhoods described above, with more household surveys undertaken in the area that is currently known to be exposed to noise levels above 60 dB LA (max) night-time.
- 8.2.29 As well, households and some businesses were surveyed to an agreed number in parts of the areas known to be exposed to airport related noise at levels lower than 60 dB LA (max) night-time. The SIA survey areas had to be identified at the same time as noise modelling was being undertaken so there may be some discrepancies in the areas selected and the final noise modelling results, however generally the areas selected should be indicative of airport noise disturbed areas.
- 8.2.30 Three social passports have been received, but no land use registry information

## 8.3 Baseline

### Current baseline

- 8.3.1 This chapter presents the current baseline conditions of the affected area focusing mainly on the directly affected area, but also referencing the indirect area of influence. In cases where data is unavailable for the directly affected area, information from the various districts and the indirect area of influence is used.
- 8.3.2 The topics covered below are:
1. Administrative area and demography
  2. Historical context of ALA
  3. Land use
  4. Economic context
  5. Community infrastructure
  6. Gender considerations
  7. Vulnerability
  8. Protection and safety zones for communities

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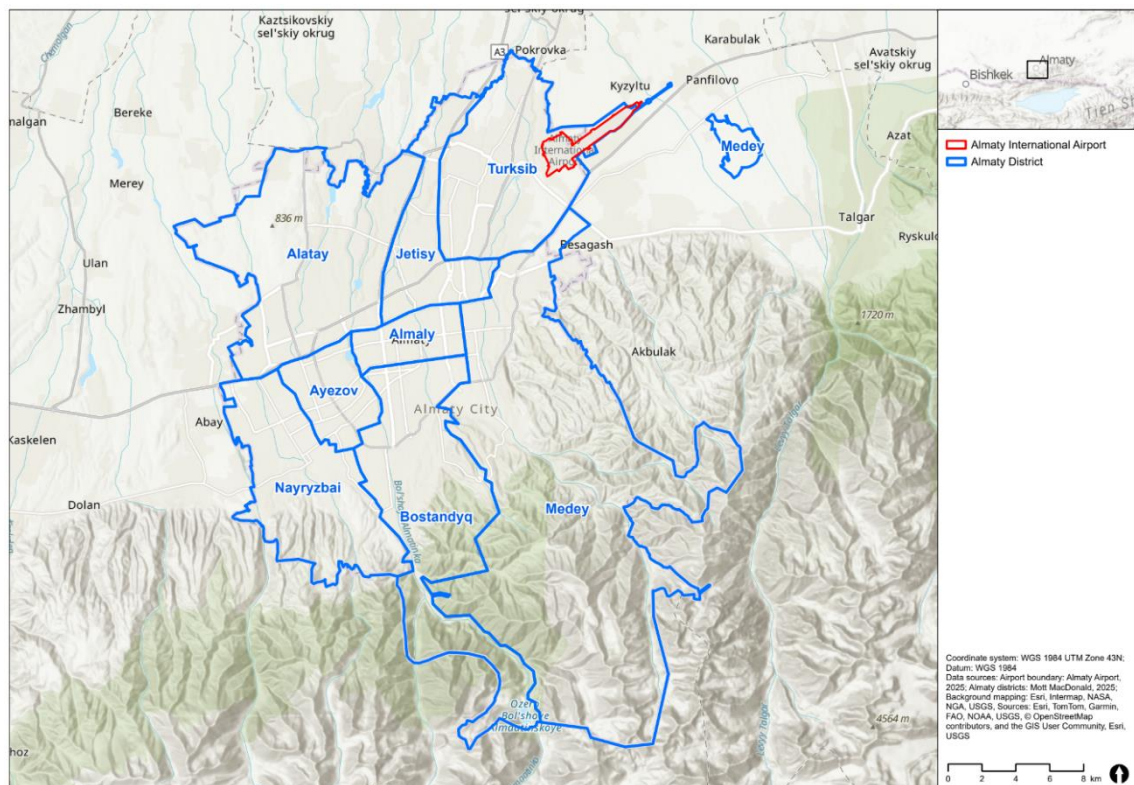
<sup>3</sup> ESRI Field Maps is a mobile app integrated with ArcGIS that enables field workers to collect, edit, and share geographic data using interactive maps

<sup>4</sup> A national website provides access to detailed and verified records of residential properties, which local authorities maintain, and which can be sourced for defined geographical areas.

## Administrative area and demography

- 8.3.3 The Almaty Region, situated in the south-eastern part of Kazakhstan along the border with Kyrgyzstan, is one of the country's seventeen administrative regions. Although Almaty City is geographically encircled by the Almaty Region, it is administratively independent and holds the status of a city of national significance - one of three in Kazakhstan. It takes about 90 minutes to drive from one side of the Almaty Region to the other side. Hence, local workers will come from the city or the region and return home to rest.
- 8.3.4 Almaty City is divided into eight districts (refer to Figure 8.5). The communities within the direct area of influence are located across both Talgar District, which is situated outside the administrative boundaries of Almaty City within Almaty Region, and Turksib District within Almaty City. Specifically, the communities of Almerék, Guldala, and Panfilovo fall within the Talgar District. Hence the baseline presents information about Talgar District and Almaty City.

**Figure 8.5: Almaty City districts**



Source: Mott MacDonald, 2025

- 8.3.5 Almaty serves as Kazakhstan's foremost economic hub and is widely regarded as the most developed metropolis in Central Asia. It is home to numerous international organisations, financial institutions, and major enterprises, playing a pivotal role in the country's economic and commercial landscape.

## Demography

- 8.3.6 Almaty Region is one of the fastest-growing areas in Kazakhstan. According to 2025 data from the Kazakh Bureau of Statistics (refer to Table 8.5 overleaf), it had a total population of 1,575,657 at the beginning of 2025, which represents growth of 1% since 2024. Within this region, Talgar District accounts for 260,690 residents, making up approximately 16% of the total population, and experiencing a growth of 2.18% since 2024.

- 8.3.7 Almaty City is the most populous city in Kazakhstan, with 2,292,055 residents as of 2025, and has experienced the most notable growth of 2.84% since 2024. Within the city, the Turksib District is home to 266,169 people, accounting for approximately 12% of Almaty's total population. After Almaty City, Talgar District has exhibited the most significant growth among the studied regions since 2024, with an increase of 2.66% compared to the previous period.
- 8.3.8 An analysis of the population by age using Kazakh Bureau of National Statistics from 2025 reveals that the region is experiencing demographic growth. In the Almaty Region, for Almaty City and Talgar District the most represented age group in 2025 comprises individuals aged between 0 and 14 years. Specifically, this age group accounts for 31% of the population in the Almaty Region, 25% in Almaty City, and 28% in Talgar District. In all cases, males constitute the majority within this age group. The average age in the Almaty Region is 32 years, while in both Almaty City and Talgar District it is slightly higher at 33 years. The age-related data demonstrates that the region has a relatively young population, with a significant proportion of individuals in the active working age group. On average, only 13% of the population across the three areas is aged 60 or above. Given that the current retirement age in Kazakhstan is 61 for women and 63 for men, this suggests a predominantly youthful and economically active demographic.

#### **Ethnic composition**

- 8.3.9 Kazakhs are the predominant ethnicity in the Project area. Kazakhs make up 61% of the population in Almaty with the second largest ethnicity being Russians (24%), followed by Uyghurs (5%), Koreans (2%), Tatars (1%) and other ethnic groups.
- 8.3.10 Mainly Russians and other minorities left the country after independence and their numbers have shrunk dramatically. Some estimates suggest about two million Russians may have left between 1989 and 2005. Kazakhstan's policy of attracting ethnic Kazakhs or kandasy<sup>5</sup> (meaning "returnee" in Kazakh) to immigrate from the neighbouring countries (Uzbekistan, China, Turkmenistan, Russia, Kyrgyzstan, Mongolia, Iran, Afghanistan, Pakistan, etc.) has in part been intended to replace the outflow of non-Kazakhs from the country since independence.
- 8.3.11 According to the KII with its akim, the Guldala rural area has more than 10,000 residents: 30% Kazakhs, 30% Russians, 30% Uyghurs, 10% Chechens, Tajiks, Uzbeks, Germans, and Poles. The deputy akim of Turksib city district indicated that its population exceeded 267,000 and was growing rapidly. Throughout its history, the neighbourhood has been multi-ethnic, having among the Kazakhs also Russians, Ukrainians, Tatars, Koreans and others. In the 2000s, kandasy returning from abroad actively settled in the district.

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<sup>5</sup> Kandasy status is temporary and can be given to a persons or family for a period not exceeding one year. Since 1991 and by the end 2020, 1,695,000 kandasy were registered in Kazakhstan, making up more than 5% of the population. More than half of kandasy who arrived in Kazakhstan in 2020 (12,300 people) settled in Almaty. Previously having no need to speak Russian, kandasy can find it difficult to integrate in the country's Russian-speaking regions. Migrating kandasy are mostly working age population (57% in 2020) with kids (32% in 2020) while pension age kandasy were 11% in 2020.



**Table 8.5: Total population of Almaty City, Almaty District, Turksib District, and Talgar District in 2025**

|                        | Population<br>Jan 2024 | Total<br>population<br>growth | Including           |                  | Population<br>Jan 2025 | For the period    |                   |
|------------------------|------------------------|-------------------------------|---------------------|------------------|------------------------|-------------------|-------------------|
|                        |                        |                               | Natural<br>increase | Net<br>migration |                        | Growth<br>rate, % | Average<br>number |
| Almaty Region          | 1,560,124              | 15,533                        | 7,673               | 7,860            | 1,575,657              | 1.00              | 1,567,890         |
| Incl. Talgar District  | 255,124                | 5,566                         | 1,136               | 4,430            | 260,690                | 2.18              | 257,907           |
| Almaty City            | 2,228,675              | 63,380                        | 22,196              | 41,184           | 2,292,055              | 2.84              | 2,260,365         |
| Incl. Turksib District | 259,294                | 6,902                         | 1,884               | 5,018            | 266,196                | 2.66              | 262,745           |

Source: Kazakh Bureau of National Statistics, 2025

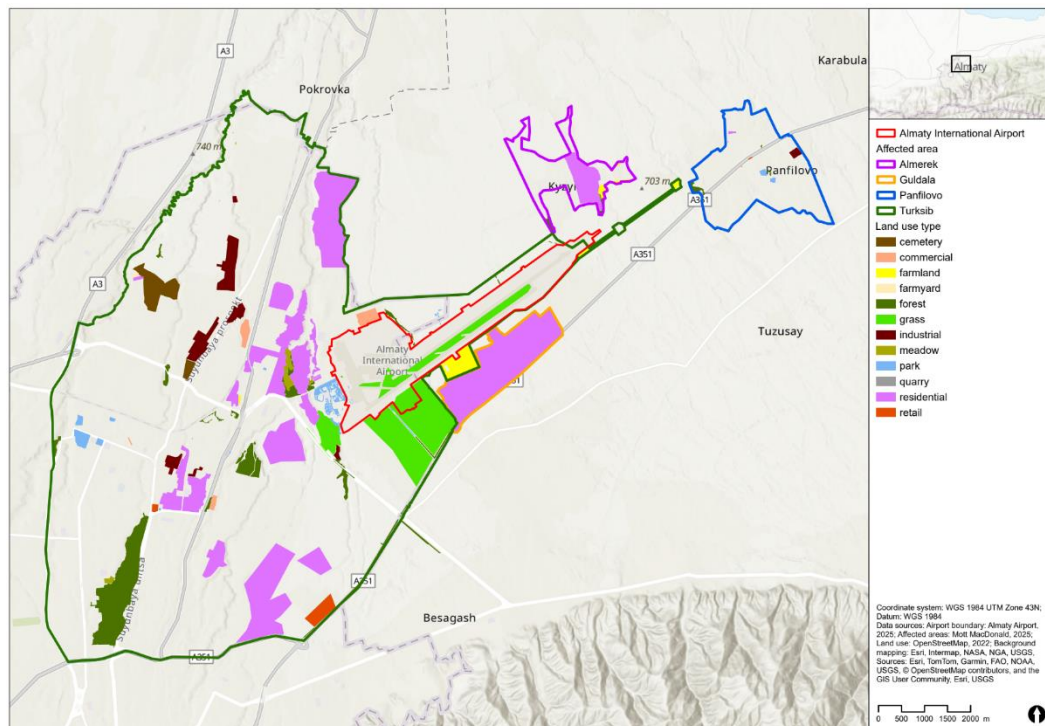
## Historical context

- 8.3.12 ALA is Kazakhstan's largest and busiest airport. It was originally established in 1935 and has since evolved into a major regional air traffic hub. Following Kazakhstan's independence in 1991, the airport underwent significant modernisation, including the construction of new terminals and runways. In 2021, TAV Airports acquired its majority stake in the airport, initiating a new phase of expansion and investment. This included the opening of the new international terminal in June 2024, increasing the airport's capacity to 14 million passengers annually. Over the past years, aircraft movements have steadily increased, driven by rising international travel demand and the airport's growing role as a transit hub between Europe and Asia. This growth has been particularly notable since TAV's acquisition, with passenger traffic and the number of destinations nearly doubling. In sum, the land use for the airport has been a constant for almost 100 years.
- 8.3.13 The presence of local communities near the airport predates TAV Airports' acquisition of the asset in 2019. Turksib District is one of the oldest of Almaty City, having been formed in 1938. According to the Turksib akimat, it is the air and railway gateway of the city, and after several different names in 1995 it was officially named in honour of the Turkestan-Siberian railway. Guldala used to be called *Krasnoye Pole* (Beautiful Field). Despite the airport, people have been attracted to the area. The local population was historically engaged in agriculture. In Soviet times there was a lot of planting, and cattle breeding. People from Guldala, Almerek and Kairat villages worked in the Kunayev State Farm that grew vegetables and fruits. Panfilovo was previously part of Raiymbek District and home to the Kalinin collective farm.
- 8.3.14 Historically, residents have been exposed to elevated noise levels from aircraft operations linked to the old airport infrastructure. These legacy impacts existed prior to the development of Project Horizon. While Project Horizon may contribute to new sources of noise, the baseline exposure is already considerable. This legacy context was a key factor considered by Lenders during Project appraisal.

## Land use

- 8.3.15 Land use within the immediate direct area of influence is predominantly residential (refer to Figure 8.6). The 2022 ESIA estimated that approximately 27,631 were residing in the noise affected communities within 4km, including 14,199 women.

**Figure 8.6: Cadastral map of land use for the direct area of influence (2021)**



Source: Mott MacDonald, 2021

- 8.3.16 Within the direct area of influence, Turksib is identified as the most urbanised district. The Turksib deputy akim indicated that because of the rapid industrial development and reasonable prices for housing, young families are also actively settling in the district, notably in the new Zhaskanat and Kairat areas. The neighbourhoods of Guldala and Almerék are experiencing rapid development, driven by the increasing number of new buildings under construction. Additionally, Almerék, Guldala<sup>6</sup>, and Panfilovo are surrounded by expanses of land designated for cultivation, highlighting a blend of urban growth and agricultural use in the region. The akim of Panfilovo stated that land began to be allocated in these villages approximately ten years ago, with the majority of new residents having relocated from Raiymbek District. Currently, half of the village of Tuzusai, half of the village of Panfilov, and the first farming unit of the village of Kyzylty fall within 4km of the airport boundary.
- 8.3.17 Based on the building identification conducted in 2021, a calculated total of 6,251 properties were estimated within a 4km radius of the airport. This included 1,021 buildings in the Turksib District, 539 in Nurshashkan, 765 in Guldala, 2,833 in South Guldala, 670 in Almerék, 521 in Panfilovo, and 842 in South Panfilovo.
- 8.3.18 Taking noise exposure into consideration, the number of affected buildings has increased significantly. The increased exposure to noise since 2021 has been affected by growth of airport activities and general population growth. Almaty has grown by 26,830 in the last year, which represents a 1.33% annual change<sup>7</sup>. Table 8.6 shows that in 2025 there are currently 71,959 buildings exposed to noise levels above 40dB during the day within a 315.9km<sup>2</sup> area around the airport. As shown in Figure 8.7, these buildings are mainly concentrated in Guldala, Panfilovo and Almerék.

<sup>6</sup> According to the Guldala Social Passport, out of the total of 3,749.44 hectares (ha), 2,991ha of land within the area are designated for agricultural and farming purposes.

<sup>7</sup> <https://worldpopulationreview.com/cities/kazakhstan/almaty>, accessed 15 September 2025.

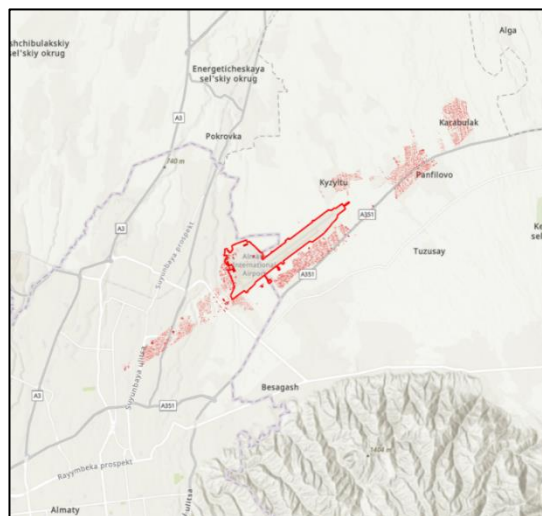
- 8.3.19 Going forward with the Project, both the area and number of building exposed to noise will increase. Table 8.6 shows that 76,680 buildings within an 351.6km<sup>2</sup> area around the airport are expected to be impacted by noise above 40dB during the day. Figure 8.8 illustrates that the majority of affected buildings in operation will be concentrated in the Turksib District. However, the increase in affected buildings across the other neighbouring areas is also noteworthy and reflects a broader trend of expanding noise exposure. Considering the large number of buildings currently exposed to high noise levels and even recognising that there will likely be technology improvements in the future whereby aircraft engines and other equipment have better noise controls, this represents a significant concern for the well-being of the affected population.
- 8.3.20 Refer to more details of the noise study findings in **ESIA Chapter 11: Noise**.

**Table 8.6: Buildings affected by noise levels (dB(A)), differentiated by day and night, for the years 2025 and 2030**

| dB(A)<br>between | 2025                    |                        |                         |                        | 2030                    |                        |                         |                        |
|------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
|                  | Lday                    |                        | Lnight                  |                        | Lday                    |                        | Lnight                  |                        |
|                  | Area<br>km <sup>2</sup> | Number of<br>buildings | Area<br>km <sup>2</sup> | Number of<br>buildings | Area<br>km <sup>2</sup> | Number of<br>buildings | Area<br>km <sup>2</sup> | Number of<br>buildings |
| 40-45            | 147.6                   | 32725                  | 142.3                   | 30042                  | 157.3                   | 39990                  | 152.4                   | 35799                  |
| 45-50            | 88.0                    | 17692                  | 80.3                    | 16104                  | 101.8                   | 16712                  | 93.0                    | 15081                  |
| 50-55            | 44.5                    | 10381                  | 40.9                    | 10050                  | 51.0                    | 9711                   | 46.7                    | 9436                   |
| 55-60            | 21.2                    | 8046                   | 18.8                    | 7285                   | 24.2                    | 7691                   | 21.8                    | 6995                   |
| 60-65            | 8.2                     | 2453                   | 7.4                     | 2008                   | 9.8                     | 2364                   | 8.7                     | 1965                   |
| 65-70            | 3.4                     | 592                    | 3.0                     | 459                    | 4.2                     | 210                    | 3.7                     | 152                    |
| 70-75            | 1.6                     | 70                     | 1.4                     | 50                     | 1.8                     | 2                      | 1.6                     | 2                      |
| 75-80            | 0.8                     | 0                      | 0.8                     | 0                      | 0.9                     | 0                      | 0.9                     | 0                      |
| 80-85            | 0.4                     | 0                      | 0.4                     | 0                      | 0.4                     | 0                      | 0.4                     | 0                      |
| >85              | 0.2                     | 0                      | 0.1                     | 0                      | 0.2                     | 0                      | 0.2                     | 0                      |

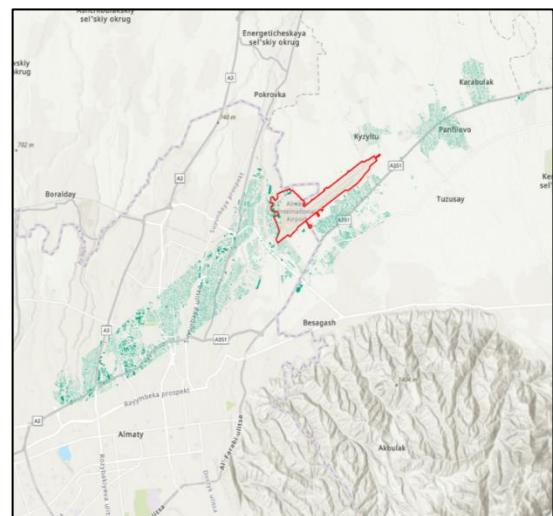
Source: Frekans, 2025

**Figure 8.7: Location of affected buildings by noise, 2025**



Source: Frekans, 2025

**Figure 8.8: Location of affected buildings by noise, 2030**



Source: Frekans, 2025

## Economic context<sup>8</sup>

- 8.3.21 The gross domestic product (GDP) of the Republic of Kazakhstan (RoK) is primarily driven by the trade and industrial sectors. Industry contributes 28% to the national GDP, while wholesale and retail trade accounts for just under 17%. Despite various government initiatives aimed at diversifying the economy and promoting non-resource-based industries, the overall structure has remained largely unchanged over the past decade. This continued reliance on raw materials is largely due to Kazakhstan's abundant oil, gas, and mineral resources.
- 8.3.22 Regional economic specialisation is closely tied to geography. Some regions are heavily industrialised, while others, benefiting from fertile land and favourable agricultural conditions, focus on farming. According to regional specialisation indicators, 65% of the country's regions are primarily specialised in either industry (35%) or agriculture (29%).
- 8.3.23 The services sector dominates the national economy, accounting for 61.3% of GDP. Within this, trade represents 17%, real estate activities 7%, and construction 6%. Sectors such as accommodation and food services, and arts, entertainment, and recreation contribute the least, each making up just 1% of GDP.
- 8.3.24 Almaty stands out as a leading region in several sectors, including construction, agriculture, forestry and fisheries, professional, scientific and technical activities, and arts, entertainment, and recreation. Notably, Almaty also plays a central role in Kazakhstan's employment landscape. As of 2024, the city's small and medium-sized enterprise (SME) sector employs approximately 972,100 people - accounting for 90% of total employment in Almaty. This underscores the city's strong orientation towards entrepreneurship, services, and private sector-led economic activity, further reinforcing its position as a key economic hub within the country.
- 8.3.25 The local population in Guldala and Almerik were historically engaged in agriculture, growing vegetables and fruits and involved in cattle breeding. The akimat of Gulalda explained that because of the airport activities, it is not possible to expand planting areas or to keep a lot of cattle. The same goes for vegetable gardens and growing vegetables and crops as they attract birds that may obstruct flights.
- 8.3.26 Turksib District is one of the oldest of Almaty City, having been formed in 1938. According to the Turksib akimat, it is the air and railway gateway of the city, and after several different names in 1995 it was officially named in honour of the Turkestan-Siberian railway. It is also one of the largest industrial districts of the city. Since the Soviet period, large enterprises, factories, locomotive repair plants, construction and processing plants have been sited there, and it is associated with hard-working, active people. The parents of many of its citizens worked in these factories and some of those enterprises still operate.

## Employment

- 8.3.27 In 2024, out of its 1,135,100 active population, Almaty City recorded a total of 1,083,000 individuals in employment, compared to 52,000 unemployed, resulting in an overall unemployment rate of 4.6%. Among young people aged 15 to 28, the unemployment rate stood at 4.4%, reflecting a significant positive decline from 8.2% in 2014. The number of economically inactive individuals, or those not participating in the labour force, was reported at 519,000.

<sup>8</sup> Zhamilya, O. (2025). Economic specialization of regions of the Republic of Kazakhstan. In SHS Web of Conferences (Vol. 212, p. 01017). EDP Sciences.

SEC Almaty. (2025, May 19). The SME sector employs 972.1 thousand people — 90% of the total employment in Almaty. <https://spkalmaty.kz/en/news/the-sme-sector-employs-972-1-thousand-people-90-of-the-total-employment-in-almaty/>

- 8.3.28 In 2023, Talgar District<sup>9</sup> recorded an active population of 122,800 individuals, of whom 117,100 were employed. The number of unemployed persons stood at 5,700, resulting in an unemployment rate of 4.6%. This marks a notable shift, as the unemployment rate had been steadily increasing since 2014, when it was recorded at 4.3%. However, 2023 represents the first year in which a downward trend was observed, following a rate of 4.7% in the previous year.
- 8.3.29 The Guldala akimat in the KII indicated that despite the airport, people are attracted to the area. Many residents work in Almaty City, mainly in retail, but also many work at the airport. The close proximity of the airport creates jobs and opportunities for services such as warehousing, catering, transport and trade. The Turksib akimat indicated that local residents realise the airport's important economic and logistical role both for Almaty and for the whole country. The airport provides many jobs, including for the residents of this neighbourhood. The airport always has vacancies, and people from the district are not excluded by criteria. Locals can apply, depending on their qualifications.
- 8.3.30 The representative of the Asar-Ume Public Foundation which supports vulnerable families in Guldala commented that over the last three to four years, proximity to the airport appeared to be an economic advantage because property prices have risen. He further informed that the city and the ring road proximity did not encourage the development of the infrastructure and facilities like hotels near the airport but all the logistical companies with their storage facilities are all around it. They provide jobs of various levels. Both, Almerek and Guldala facilities and infrastructure are in sufficient quantity and condition: schools, shops, streets condition is good and the area is being developed further. The ring road opening affected this development positively.

#### **Tourism**

- 8.3.31 When it comes to tourism impact, Zheldibayev *et al* (2024)<sup>10</sup> reveals that tourist flows to Almaty have shown a marked increase over the past decade. In 2014, the number of foreign visitors to Kazakhstan stood at 679,000, rising to 1,084,800 in 2023 - a 16.9% increase compared to 2022. During the first nine months of 2023, the highest numbers of tourists originated from Russia (58,200), Uzbekistan (11,200), and Kyrgyzstan (3,100). Specifically in Almaty, 261,571 foreign tourists arrived in 2023, alongside 710,586 domestic visitors. As a result, tourism accounted for 11.3% of Almaty's GDP.
- 8.3.32 The study identified several key challenges that must be addressed to further enhance tourist flows to the city. Chief among these is the need to improve infrastructure, making it more convenient and attractive for visitors. Additionally, investment in marketing and promotional campaigns is essential to draw tourists from a wider range of regions and countries. Almaty's unique offerings, such as cultural events, culinary festivals, hiking, and skiing, were also recognised as valuable assets for attracting both domestic and international tourists.
- 8.3.33 The development of tourism in Almaty includes improving service quality, encouraging entrepreneurship, increasing local income and employment, and analysing current trends and future prospects. The main priorities identified include enhancing infrastructure, improving tourism services, fostering cooperation with local tourism companies, creating accessible and

<sup>9</sup> Based on information from the Guldala Social Passport (2021), out of a total population of 17,466 residents, 796 individuals were of working age, representing approximately 4.56% of the population. Among them, 7,601 were employed, and 1,736 were self-employed. A total of 162 individuals were unemployed, of whom 55 were under the age of 35, accounting for 34% of the total unemployed population. Additionally, 55 individuals were classified as working-age pensioners, also representing 0.31% of the population.

<sup>10</sup> Zheldibayev, A., Kulazhanov, Y., Moldagaliyeva, A., Abdildayeva, N., Zhoya, K., Sarkitkan, K., ... & Pavlichenko, L. (2024). Study of the Current State and Prospects for the Development of Tourist Flow in the City of Almaty, Kazakhstan. *Geo Journal of Tourism and Geosites*, 57, 1952-1963.

well-designed tourist routes, promoting cultural events and festivals, and establishing international partnerships.

### **Community infrastructure<sup>11</sup>**

- 8.3.34 Almaty is the largest city in Kazakhstan and serves as the country's financial, business, transport, scientific, educational, and cultural centre. In recent years, Almaty has made significant progress in infrastructure development, with priorities including social and engineering infrastructure, transport, housing, public safety, and emergency preparedness. Between 2018 and 2023, the city saw the construction of 130,300 apartments, 22 schools, 24 kindergartens, one hospital, and four outpatient clinics. Nearly 1 trillion tenge was invested in the transport sector, with 1,150 new buses and 100 trolleybuses purchased, 25km of new roads built, and 200km repaired in 2023 alone.
- 8.3.35 Despite ongoing challenges, Almaty ranks highest in Kazakhstan for infrastructure quality, with 89.1% compliance with the System of Regional Standards by the end of 2022. This is largely due to the availability of educational, healthcare, cultural, and sports facilities. However, the city faces issues with ageing infrastructure, particularly in water supply (only 19.1% compliance, with 56% of networks worn out), wastewater disposal (47.7% provision, with 57.5% wear), and heating (60% network deterioration). While gas supply coverage is high at 99.2%, only 57.7% of infrastructure meets standards due to 36% pipeline wear. Electricity is universally available, but 65% of networks are worn and 13% of power is lost in transmission.
- 8.3.36 Transport remains a major concern. Although several interchanges and the Big Almaty Ring Road (BAKAD) have been completed, rapid population growth and increasing car ownership strain the system. Public transport provision is at 65.7%, road infrastructure at 89.8%, and street lighting at 84.0%. By 2024, it was estimated that the city needed 1,000 more buses, 200 trolleybuses, and 30 new routes. To address this, Almaty has adopted a Transport Master Plan to 2030, aiming to develop multimodal corridors, expand the metro, convert buses to gas and electricity, and build three major transport hubs. By 2026, the plan envisions 14 transport corridors and a more mobile, accessible city. There are also plans to connect BAKAD with the airport entry by a straight road to bypass the residential areas.
- 8.3.37 The Turksib akimat informed in the KII that global positioning system (GPS) applications on phones and maps leads drivers from BAKAD through the streets of Almerek and Guldala. His perception is that these streets are already congested in peak hours and the hours when most of the international flights arrive. But he also noted that the airport has changed the night flight schedule to reduce traffic jams and noise.

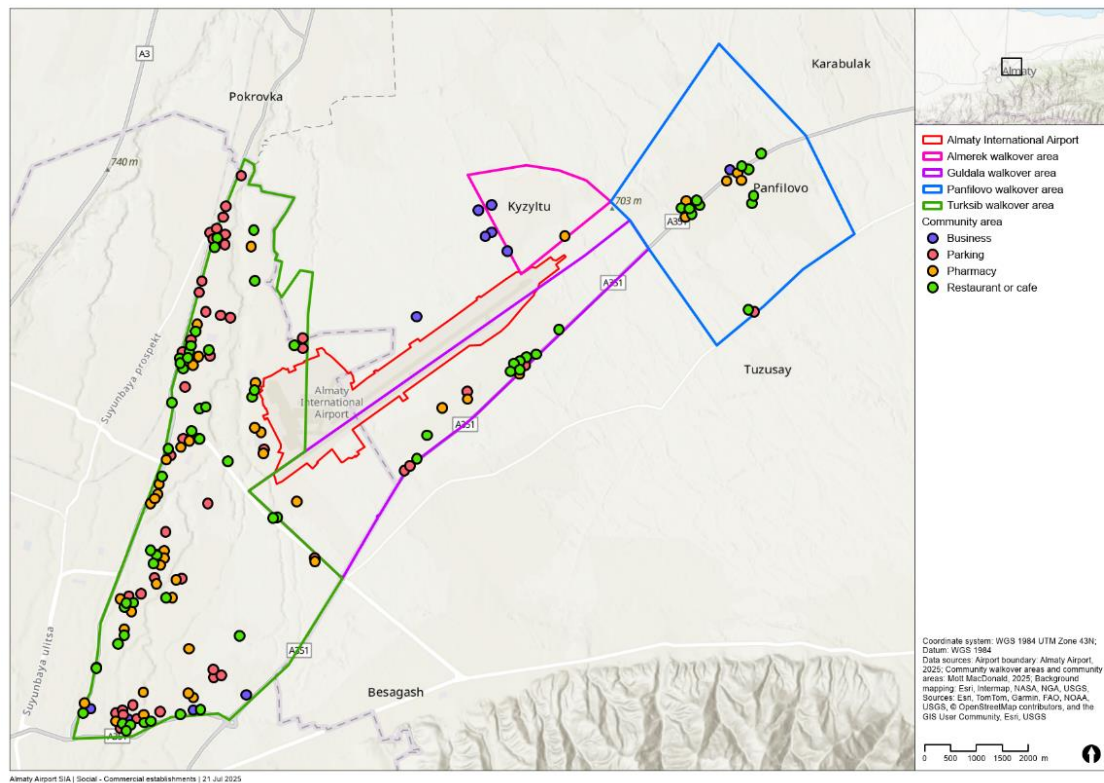
### **Community mapping infrastructure identification**

- 8.3.38 During the community mapping process (refer to Section 'Primary data collection') within the direct area of influence, various types of buildings were identified from a social perspective. The following maps highlight buildings categorised as either commercial establishments (refer to Figure 8.9) or public-use facilities (refer to Figure 8.10).

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<sup>11</sup> Institute of Economic Research (2024) Infrastructure development in Almaty.  
[https://eri.kz/ru/Novosti\\_instituta/id=6390](https://eri.kz/ru/Novosti_instituta/id=6390)

**Figure 8.9: Commercial establishments**

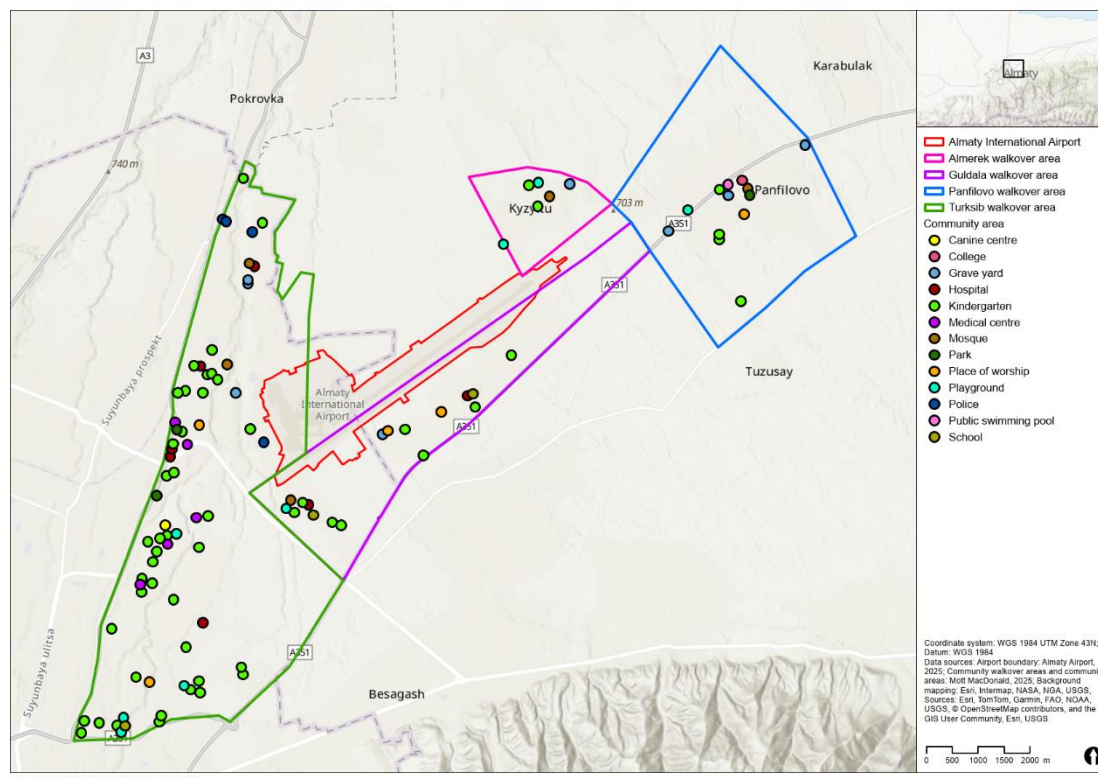


Source: Mott MacDonald, 2025

- 8.3.39 With regard to commercial establishments, the community mapping process identified in the direct area of influence (refer to Figure 8.9) a total of 11 businesses, 64 restaurants or cafés, 44 pharmacies, and 46 parking facilities. The majority of these facilities are concentrated in the Turksib District, which is the most developed area within the direct area of influence.



**Figure 8.10: Community facilities**



Source: Mott MacDonald, 2025

- 8.3.40 With regard to community facilities, the community mapping exercise identified a range of infrastructure, including three schools, 54 kindergartens, nine playgrounds, two parks, seven hospitals, two medical centres, five places of worship, five mosques, four police stations, and eight graveyards.
- 8.3.41 The representative of the Asar-Ume Public Foundation informed that the city and the ring road proximity do not encourage the development of the infrastructure and facilities like hotels near the airport but all the logistical companies with their storage facilities are around it, providing jobs of various levels. He indicated that Almerek and Guldala facilities and infrastructure are in sufficient quantity, that the conditions of schools, shops, and streets are good, and that the area is being developed further. He said that the ring road opening positively affected local development to a great extent.
- 8.3.42 The Turksib deputy akim commented that the airport contributes to the development of logistics, transport, trade, services, etc. Furthermore, he stated that the presence of the airport in general raises the status of the neighbourhood and makes it more accessible by transport. He also mentioned some discomforts, which are covered in the impact assessment analysis.
- 8.3.43 Based on the facilities examined, it can be concluded that the direct area of influence is a developed region, with Turksib being the most urbanised of the neighbourhoods. The notably high number of kindergartens within the direct area of influence is particularly relevant when considering the noise levels recorded in the studied neighbourhoods.

## Gender considerations

- 8.3.44 According to national statistics, in May 2025 there were 10,397,426 women in the RoK representing 51% of the total population. This trend remains consistent within the study area: in



the Almaty Region, women represent 50% of the population; in Almaty City 53%; and in Talgar District 51%.

- 8.3.45 The United Nations Development Programme (UNDP) and United Nations Women in Kazakhstan, with support from the Ministry of Culture and Information of the RoK, released in 2024 an analytical report titled “Public Perception of Gender Equality and Women’s Empowerment in Kazakhstan”.<sup>12</sup> The report draws on data from a survey of 3,800 respondents across all 17 regions of Kazakhstan and the three cities of republican significance. Experts interviewed for the study identified several persistent gender-related challenges in the country, including underrepresentation of women in politics and leadership, a gender pay gap, horizontal and vertical gender segregation in the labour market, legislative shortcomings, domestic violence, and harassment.
- 8.3.46 These issues were also partially reflected in the findings of the mass survey and focus group discussions which informed the study, although many respondents did not fully grasp their scope or implications. Despite the challenges, 76% of the study respondents believed the gender situation in Kazakhstan is satisfactory, with women’s rights and opportunities seen as sufficient or even excessive. This perception is more common among men, while women are significantly less likely to feel that their rights are fully realised.
- 8.3.47 A key factor contributing to gender inequality is the persistence of entrenched stereotypes about gender roles. One of the most widespread is the belief that a woman’s primary role is to bear and raise children. These norms often overshadow other forms of self-realisation, such as career development, civic engagement, or political participation. Both the study’s experts and focus group participants noted that gender roles and behavioural expectations begin forming in early childhood. When asked whether a woman’s primary duty is to maintain the home and care for children without working, 54% of women and 68% of men agreed. Only 6% of women and 2% of men supported the idea of a woman being the head of the household.
- 8.3.48 According to the study, these stereotypes significantly limit women’s ability to participate in public life. Respondents of both genders agreed that women have the least rights and opportunities in politics and public life, and the most within the family. Many women in the study expressed that these limitations feel restrictive. Women are also more likely than men to report experiencing gender-based discrimination and to acknowledge the existence of gender inequality, with 37% of women reporting violations of their rights based on gender, compared to 19% of men.
- 8.3.49 Gender-based violence, including intimate partner violence and harassment, remains a pressing issue in Kazakhstan. While most study respondents expressed opposition to violence against women, many failed to recognise certain behaviours - such as forced sexual acts without consent, intimidation, and controlling a woman’s appearance or finances - as forms of violence.
- 8.3.50 Although experts generally avoid singling out specific regions, they often cite southern and western Kazakhstan as areas of concern. Quantitative data supports this: in Shymkent, the proportion of respondents who condone physical violence against women is 5.1 times higher than in Akmola Region or Almaty City, 5.7 times higher than in Astana, and 7.3 times higher than in the North Kazakhstan Region.

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<sup>12</sup> UNDP (2024). Public perception of gender equality and expansion of women's rights and opportunities in Kazakhstan. Available at: <https://www.undp.org/kazakhstan/publications/public-perception-gender-equality-and-expansion-womens-rights-and-opportunities-kazakhstan#:~:text=In%202023%2C%20the%20UN%20Development%20Programme%20%28UNDP%29%20in,and%20women%27s%20empowerment%20in%20the%20Republic%20of%20Kazakhstan>. Last accessed on 26 July 2025.

- 8.3.51 In conclusion, while public perception in Kazakhstan may suggest that gender equality has been achieved, the study's data revealed persistent structural inequalities, deeply rooted stereotypes, and regional disparities that continue to limit women's rights, opportunities, and safety.

### **Community vulnerability indicators from survey respondents**

- 8.3.52 For the purposes of this assessment, vulnerable individuals were defined as those suffering from illnesses, residing in poor housing conditions, living in households with a high number of dependents, such as elderly persons and children, or living in poverty.
- 8.3.53 According to responses from Survey A, 165 households reported having at least one member receiving some form of government subsidy. Of these, 84 were located in Turksib, 37 in Guldala, 24 in Almerék, and 20 in Panfilovo. Among the government subsidies reported by respondents, the most prevalent was retirement support or pension, received by 56.52% of those who confirmed receiving assistance. Support for large families followed, accounting for 23.91%, while 8.70% reported receiving support for disabled adults. Maternity support was mentioned by 5.43% of respondents, and support for disabled children by 2.17%. Other forms of assistance were less common, each representing 0.54% of the total, including Kandasi, loss of breadwinner, orphan allowance, and single mother support.
- 8.3.54 According to the results of both surveys, residents within the AoI identified elderly individuals as the most vulnerable group. Considering the number of people receiving pensions, it is evident that this demographic is significantly overrepresented among vulnerable populations. Furthermore, elderly individuals are more likely to suffer from health conditions. As will be discussed in the next section on Vulnerability to noise, older adults are also among those most affected by noise associated with airport operations.
- 8.3.55 Survey B identified five houses in poor condition—three in Almerék, one in Turksib, and one in Panfilovo, while Survey A reported 19 houses in poor condition, with the majority located in Nurshashkan (seven) and Guldala (four)<sup>13</sup>. Of these 19 households, eight were receiving government subsidies: four due to large family status, one for a combination of disability and retirement, two for pension support, and one for both pension and motherhood.
- 8.3.56 In summary, out of the 435 surveys undertaken as part of Survey A, 38% of households reported receiving government subsidies, an indicator of vulnerability, with the highest concentration located in Turksib. However, when considering the proportion of respondents within each neighbourhood, Panfilovo and Almerék emerge as the most vulnerable communities. Approximately 50% of surveyed households in both areas (24 out of 50 in Almerék and 20 out of 50 in Panfilovo) reported receiving some form of subsidy. In contrast, when focusing on housing conditions, the neighbourhoods of Guldala and Nurshashkan show the highest concentration of dwellings in poor condition, indicating a different dimension of vulnerability that is not solely captured by government subsidy data.

### **Vulnerability to noise**

- 8.3.57 The vulnerability examined in this chapter centres on the impact of aircraft noise exposure, with particular attention to groups identified as most sensitive to its psychological and physiological

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<sup>13</sup> According to an interview with the district police inspector of Guldala, the neighborhood's proximity to the city contributes to a frequently changing population, with many newcomers residing in rented apartments without official registration. Residents in such housing situations are considered vulnerable due to the precarious nature of their living arrangements. According to the district police inspector of Guldala, approximately 50% of the local population is officially registered, while the remainder are not. The area is home to many low-income families, and financial hardship often leads to domestic disputes and incidents of theft. The majority of reported crimes in the neighbourhood are theft-related.

effects. According to the WHO Noise facts sheets<sup>14</sup> and academic papers<sup>15</sup>, these groups include children, the elderly, and shift workers.

- 8.3.58 The elderly are especially susceptible due to naturally fragmented sleep patterns and a reduction in deep sleep phases. Although studies show that the actual duration of deep sleep in elderly individuals is not significantly altered by aircraft noise levels, their subjective experience of sleep quality declines as noise exposure increases. This group also reports higher levels of annoyance, likely because they spend more time awake during the night, increasing their awareness of noise events. Interestingly, despite their heightened sensitivity, elderly individuals experience fewer noise-induced awakenings compared to adults aged 18 to 55.
- 8.3.59 Children, while less likely to report annoyance or consciously perceive sleep disturbances, show measurable physiological changes. Higher aircraft noise exposure is associated with reduced deep sleep duration, although children's self-assessed sleep quality remains largely unaffected. Like the elderly, children also experience fewer awakenings from noise than middle-aged adults. However, their vulnerability is compounded by their developmental stage and limited coping mechanisms, which make them more susceptible to long-term impacts.
- 8.3.60 Shift workers, particularly those who sleep during the day, represent another highly vulnerable group. Their irregular sleep schedules expose them to more frequent and intense noise events during rest periods. Among all groups studied, shift workers exhibited the most significant increases in wake time during sleep, indicating a marked disruption in sleep continuity and quality.
- 8.3.61 Together, these findings illustrate how aircraft noise affects vulnerable populations in distinct but interrelated ways, with implications for both immediate well-being and long-term health and cognitive outcomes.
- 8.3.62 As discussed under land use, the airport has been in place for almost 100 years so neighbourhood residents having been coping with its noise effects since their birth. Nonetheless, with the Project, exposure to noise levels will change and increase with the growing airport use (refer to **ESIA Chapter 11: Noise**).
- 8.3.63 The above study findings are reflected in comments made in the KIs and surveys. According to the Guldala akim, families with young children who are sensitive sleepers are woken up by the noise, preventing their mothers from getting enough sleep. Elderly people also have sleep problems and noise disturbs their sleep.
- 8.3.64 Guldala's senior nurse also noted that the individuals most affected by noise are the elderly, those with hypertension, and children with cerebral palsy. However, she also stated that even individuals in good health may experience fatigue and strain on their nervous system due to prolonged exposure. Overall, she felt that the presence of the airport has led to an increase in the prevalence of certain illnesses<sup>16</sup>. This view was echoed by the Imam of the Guldala mosque, who stated that the rise in certain illnesses is linked to deteriorating air quality, which he attributes to increased airport activity. On the other hand, the deputy head physician in a Turksib district clinic stated that noise and air pollution from the airport are not direct causes of disease, but they can play a role as a triggering factor. However, she expressed concern that the rising number of flights may pose a risk to the local population, particularly vulnerable groups. This

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<sup>14</sup> WHO (2011) Noise. Available at <https://www.who.int/Europe/news-room/fact-sheets/item/noise>. Accessed on August 2025.

<sup>15</sup> Bartels et al. (2024). Proceedings of INTER-NOISE 2024 'Aircraft noise effects in vulnerable populations'

<sup>16</sup> She stated that, in comparison with other villages in the Talgar district, Guldala reports a higher incidence of cancer, allergies, hypertension, and respiratory conditions such as chronic obstructive pulmonary disease, asthma, and tuberculosis. Among younger individuals, cases of high blood pressure, asthma, and allergies have also become increasingly common.

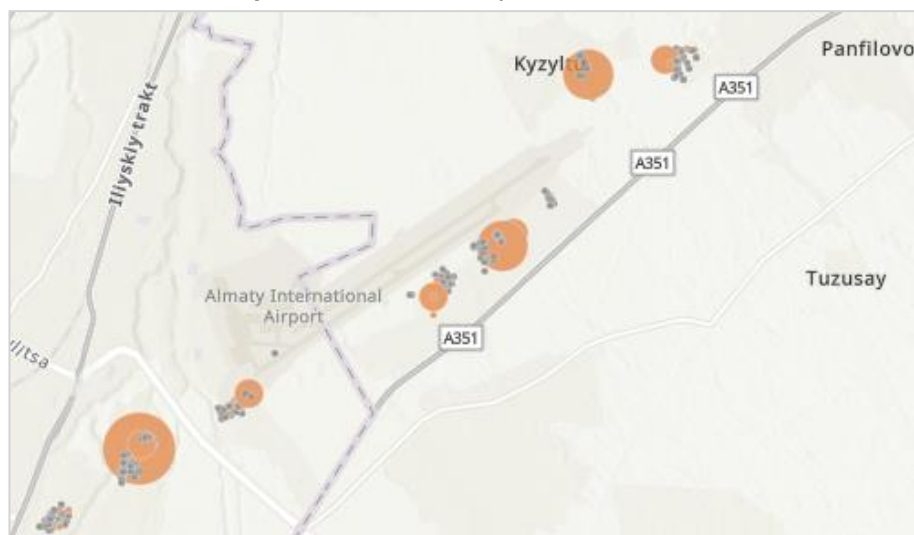
includes individuals with cardiovascular conditions (particularly common among residents), patients suffering from chronic respiratory illnesses such as chronic obstructive pulmonary disease (COPD), and those with allergies triggered by atmospheric emissions.

- 8.3.65 The representative of the Asar-Ume Public Foundation stated that in terms of noise, people say that when the aircraft flies right above a house, it is noisy, but when it flies slightly sideways, because it is low, the noise is considerably less. None of the families that they accommodated in Guldala and which they monitored, complained about the noise.
- 8.3.66 The Turksib deputy akim also mentioned discomfort related to the planes' noise and their physical presence overhead, especially in Zhaskanat, Kairat and Nurshashkan areas, but he qualified it saying that the noise has become a familiar background and people simply do not pay attention to it in their daily life. He explained that he lives directly next to the airport, and planes fly by, but one does not pay so much attention to it, because one has gotten used to it already. He further informed that the council receives very few complaints are about aircraft noise and the airport but that he thinks there are segments of the population who are more vulnerable to noise impact. For example, the elderly who are particularly sensitive to noise, also those who have sleep disturbance, some kind of anxiety, chronic cardiovascular, neurological, psycho-emotional disorders. Also, toddlers may wake up from the aircraft noise. But in his opinion, aircraft noise will be part of everyday life for the Turksib District. In addition to the airport noise, the district also has noise from the trains that pass through the neighbourhood.
- 8.3.67 According to the KII conducted with the principal of a Panvilovo school, the primary issue caused by noise at the school is its impact on pupils' attention spans. This is particularly noticeable during outdoor activities or school events. Although students gradually become accustomed to the noise, it remains disruptive during lessons. Pupils often gaze out of the window, and teachers are frequently required to pause, repeat instructions, and re-engage the class due to noise, which negatively affects concentration and the overall learning environment.

#### **Survey results for noise effects**

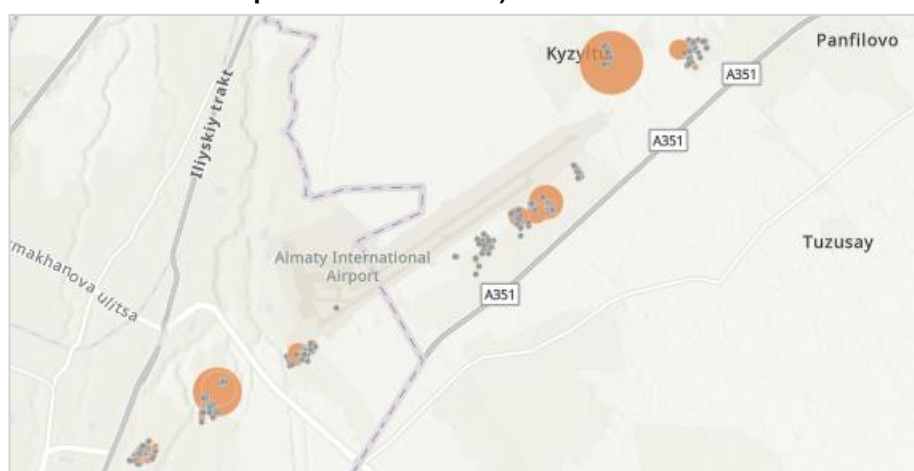
- 8.3.68 The survey, conducted in July 2025 as part of this ESIA in the areas currently exposed to noise levels above 60 dB(A) LA (max), included several questions addressing the perceived impact of noise. In response to the question which asked about the number of household members whose health has been affected by airport activities, 79 households of 430 answered affirmatively (18%). Of the 79 households identifying noise impacts, 34 receive government subsidies, considered an indicator of general vulnerability. Among the affected households, 63 male and 67 female individuals had experienced health impacts due to airport noise. The distribution of affected residents by neighbourhood and sex is shown below in Figure 8.11 and Figure 8.12.

**Figure 8.11: Distribution of female individuals who perceive that their health has been adversely impacted by exposure to airport noise (size of circle indicates number of individuals who responded in that area)**



Source: Mott MacDonald, July 2025

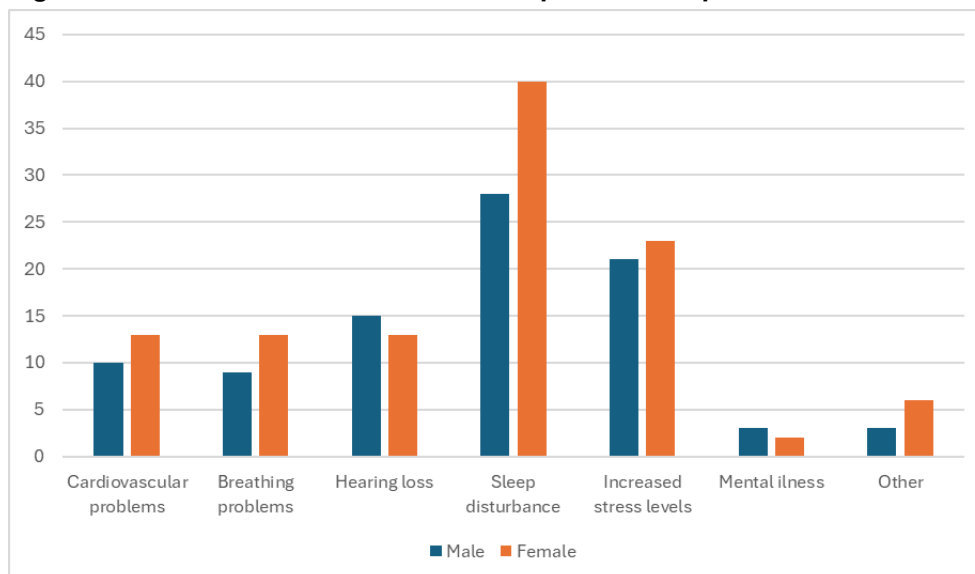
**Figure 8.12: Distribution of male individuals who perceive that their health has been adversely impacted by exposure to airport noise (size of circle indicates number of individuals who responded in that area)**



Source: Mott MacDonald, July 2025

- 8.3.69 Turksib is the neighbourhood where the highest number of female individuals were reported as being affected by airport noise. This trend can largely be attributed to the greater number of surveys conducted in that neighbourhood (224 of 430). However, it is noteworthy that Almerék and Guldala residents show a higher likelihood of having at least one household member affected - both female and male - when considering the proportion of surveys conducted in those areas.
- 8.3.70 When examining the types of health effects experienced by household members exposed to airport noise (refer to Figure 8.13), sleep disturbance emerges as the most commonly reported issue, particularly among women. This is followed by elevated stress levels, which also show a higher prevalence among female respondents. In contrast, hearing loss and mental health conditions are more frequently reported by male household members.

**Figure 8.13: Health effects attributed to exposure to airport noise**



Source: Mott MacDonald, 2025

- 8.3.71 Regarding the ages of individuals reporting health effects attributed to the airport, the youngest male was two months old (experiencing sleep disturbances), while the oldest was 75. Among women, the youngest age recorded was three years old, and the oldest was 79. In terms of reported cases, 12 men over the age of 60 stated that their health had been affected by airport operations, along with five boys under the age of 18. Among women, 12 respondents over 60 and two girls under 18 also reported health impacts.
- 8.3.72 In Survey B, respondents identified the most common vulnerable groups in the area as pregnant women (12%), followed by families with an adult with a disability (8%), and large families (6%). When asked about the most vulnerable groups to noise in the neighbourhood, the most frequently mentioned were pregnant women and the elderly, each cited by 12% of respondents. When asked how noise affects people in the neighbourhood, 32.47% of respondents said it wakes them up, 22% reported that it causes window vibrations, 20% mentioned disruptions to television or internet connections, and 14% said it leads to headaches.
- 8.3.73 As is mentioned more in the next section, households who are building structures illegally without permits are vulnerable. The Asar-Ume Public Foundation has been working in Guldala and Almerek and has provided housing support for 10 to 30 families a month according to a crisis centre list it maintains of poor large families eligible for housing including those with children with cerebral palsy.

### Discussions on protection and safety zones for communities

- 8.3.74 The 2022 ESIA identified various zones that are being considered by ALA and a range of authorities including the ministries of health, transport and environment. The zones presented below that are being discussed by government and communities are a sanitary protection zone, an aviation safety zone, and a public safety zone. After a summary of the discussions with authorities, public inputs on these zones is described.
- 8.3.75 **Sanitary protection zone (SPZ)** refers to any area around the airport complex declared (or to be declared) as a sanitary protection zone for the purposes of regulating the level of noise or other environmental pollutants arising from aviation activities pursuant to the laws of the

RoK<sup>17</sup>. In Kazakhstan, an SPZ can be established by the Ministry of Health and environmental authorities to protect public health from environmental and sanitary impacts such as:

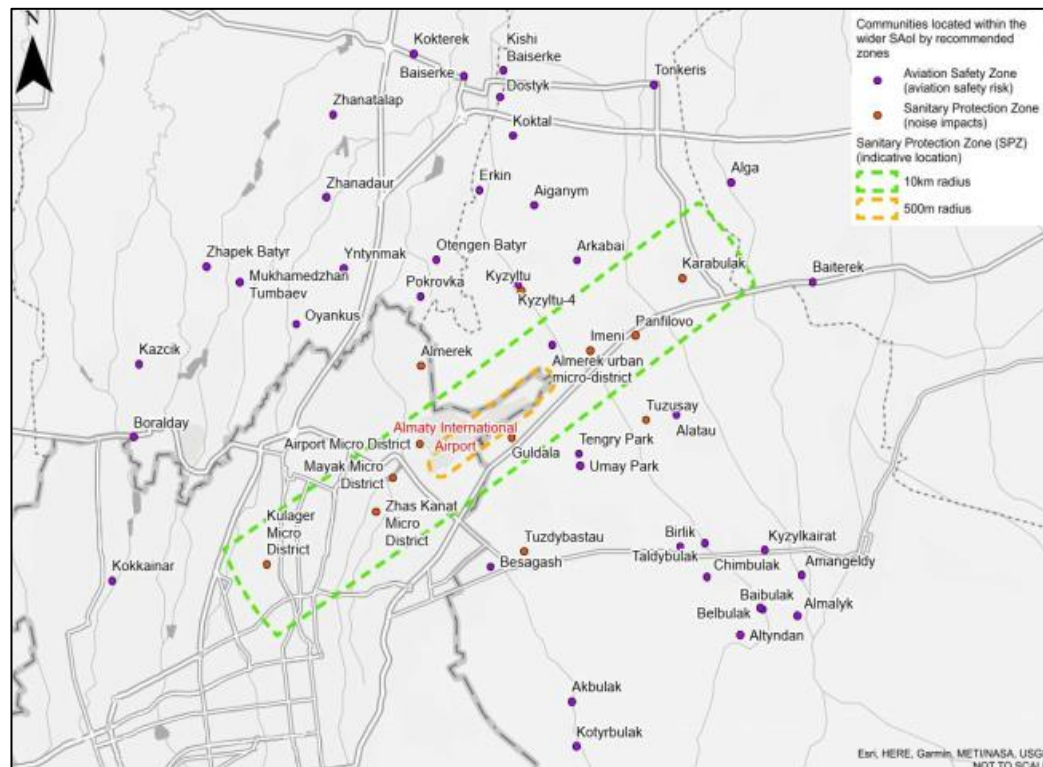
- Noise pollution – supporting compliance with permissible noise level standards, especially near residential areas and facilities such as schools and hospitals servicing sensitive or vulnerable groups
- Air quality and emissions – addressing airborne pollutants from activities such as airport operations, ground vehicles and fuel storage. This would include the range of pollutants assessed in **ESIA Chapter 5: Air quality**
- Water and soil contamination – preventing contamination, in the case of the airport for fuel spills, de-icing chemicals and wastewater (refer to **ESIA Chapter 9: Geology and Soils** and **ESIA Chapter 14: Water Resources**)
- Radiation or electromagnetic exposure – addressing radiation safety, when near radar installations or other high frequency equipment
- General health and epidemiology safety – focusing on minimising health risks to communities

8.3.76 SPZs in Kazakhstan may apply to industrial facilities, waste treatment plants, and others including the Almaty airport. Residential housing, schools, hospitals, and other sites sensitive to noise impacts are prohibited in the SPZs. The 2022 ESIA referenced that a zone of 500m was being considered for establishing the SPZ. However, the noise modelling at that time identified that noise impacts may extend up to 10km from the ends of the runway (because of the take-off and landing of aircraft from those directions) and up to 2km perpendicular to the runways. For comparison, Figure 8.14 shows neighbourhoods and the 500m and 10km distance from the airport. In an October 2024 public meeting in Guldala, the SPZ was discussed. Where the 500m would be measured from, either the runway centre or from the airport boundary fence, was covered but not resolved. ALA has developed a SPZ draft, which has been accepted by the relevant authorities, although it has not yet been formally finalised. However, if the zone was established, the construction of any new residential buildings within it would likely be prohibited.

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<sup>17</sup> Including the Environmental Code of the Republic of Kazakhstan dated 9 January 2007 No.212, the Code on People's Health and Healthcare System dated 18 September 2009 No-193-IV and the Sanitary regulations "Sanitary and epidemiological requirements for the establishment of a sanitary protection zone of industrial facilities" (approved by Order of the Ministry of National Economy No. 237 of 20 March 2015).

**Figure 8.14: Distances from the airport**



Source: Mott MacDonald 2021

8.3.77 **Public safety zone (PSZ)** is the area of land at the ends of the runways of an airport complex, within which development should be restricted in order to control the number of people on the ground at risk of death or injury in the event of an aircraft accident during take-off or landing. The term “public safety zone” does not appear in RoK legislation. However, the 2020 air safety study<sup>18</sup> commissioned by ALA recommended enhancing control over land use near the airport by establishing a ‘Public Safety Zone’ and using the British “Control of Development in Airport Public Safety Zones<sup>19</sup>” to delineate the PSZ. The 2022 ESIA identified that this zone can vary from 100-350m width at the end of the runways and a total length of 280-3,000m. In addition to recommending that such zone limit any future development in the vicinity of the runways in the airport and permit only suitable land use; the study recommended retaining all existing buildings constructed to date in compliance with the planning requirements of Kazakhstan, while controlling, limiting or not allowing any future planning and land use within such safety areas/zones.

8.3.78 **Aviation safety zone (ASZ)** refers to the territory of the land's surface with the centre at the control point of the aerodrome and the radius defined by the authorised agency in the spheres of civil and state aviation, within which certain activities are subject to regulation on grounds of aviation safety pursuant to the laws of the country<sup>20</sup>. The term ASZ does not appear in RoK legislation but is recognised internationally. Instead, the RoK legislation uses the concept of

<sup>20</sup> For the RoK, this includes Article 90 of the Law On Use of Air Space of the Republic of Kazakhstan and Aviation Activity dated 15 July 2040 No. 339-IV and the Rules for the Authorization of Activities That May Pose a Threat to Aircraft Flight Safety, approved by Government Resolution dated 12 May 2021 No.504, which specify, inter alia, that a recommendation from the airport commission is necessary in order to build any object of any height at a distance of up to 4km from the nearest point of the runway.



aerodrome vicinity. The Aviation Administration of Kazakhstan (AAK) defines an aerodrome vicinity as a radius of 46km from the aerodrome reference point. The Government of Kazakhstan<sup>21</sup> uses the concept in its decree of 2011 to control developments and operations against potential risks to aviation safety within the vicinity and around the airport. The decree applies a 4km radius from the nearest point of the runway and 15km from the airport control point and requires a permit to station objects within these two radiuses. Refer to Table 8.7.

**Table 8.7: General RoK aviation safety restrictions**

| Restrictions within 4km                                                                                                                                                                                                         | Restrictions within 15km                                                                                                   | Restrictions within the airport boundaries                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Any object of any height is subject to permitting                                                                                                                                                                               | Any object with true (geometric) height of 45m or above relative to the level of the airfield                              | Any object with true (geometric) height of 100m or above relative to the ground level |
|                                                                                                                                                                                                                                 | Any domestic waste dumping sites, fur farms, slaughterhouses and other facilities that may attract a large number of birds |                                                                                       |
| Communication lines, power transmission lines, as well as other objects of radio, electromagnetic and light radiation, which can interfere with the normal operation of aviation radio equipment and light-signalling equipment |                                                                                                                            |                                                                                       |
| Flare devices for emergency combustion of discharged gases. When determining the height of flare devices, the maximum possible height of the flame is taken into account                                                        |                                                                                                                            |                                                                                       |
| Industrial and other enterprises and structures which may lead to a deterioration in visibility in the areas of airfields (heliports)                                                                                           |                                                                                                                            |                                                                                       |
| Explosive objects                                                                                                                                                                                                               |                                                                                                                            |                                                                                       |

Source: Law "On the use of airspace of the Republic of Kazakhstan and aviation activities" dated 15 July 2010; "Rules of issuance of permits for the activities that may pose threat to flights safety", approved by the Decree of Kazakhstan's Government<sup>22</sup>

- 8.3.79 Within 4km of an airport, national law<sup>23</sup> allows constructing low-rise individual houses in a simplified manner under a sketch design, without the need to obtain specific permits or undergo complex procedures<sup>24</sup>. However, in respect of other small-scale commercial and technical facilities that are normally located in urban districts (e.g. vehicle servicing depots, small shops, etc.) a broader list of permits may apply.
- 8.3.80 The Guldala akim in the KII suggested that there are almost 500 illegally built cottages in the 500m high noise level area. For people living in these houses, the biggest problem is the lack of possibility to legalise these houses as they do not have registration and resident permits, and they cannot use free medical care and have no access to social assistance. The legalisation process (which is allowed by national legislation) was moving forward but due to the 2019 plane crash (see below), it was suspended. Now a main delay for legalisation is the Guldala Master Plan, which the Department of Architecture and Construction cannot finalise due to the

<sup>21</sup> The Rules of issuance of permits for the activities that may pose threat to flight safety. Government of the Republic of Kazakhstan. (2011, May 12). Decree No. 504 on Approval of the Rules for Issuing Permits for Activities that May Pose a Threat to the Safety of Aircraft Operations. <https://caa.gov.kz/en/department-for-issuing-permits>

<sup>22</sup> Government of the Republic of Kazakhstan. (2011, May 12). Decree No. 504 on Approval of the Rules for Issuing Permits for Activities that May Pose a Threat to the Safety of Aircraft Operations. <https://caa.gov.kz/en/department-for-issuing-permits>

<sup>23</sup> Article 60.2, Law "On Architectural, Town-planning and Construction Activities in the Republic of Kazakhstan" No.242-II dated 16 July 2001 (the "Construction Law").

<sup>24</sup> By law, a land plot is first granted by the akimats as a short-term lease (up to 3 years) and after commissioning of the constructed facility: i. Land is purchased by a land user as ownership, or ii. Lease rights thereto are extended for a long-term period.

discussions about the SPZ. The representative of the Asar-Ume Public Foundation which found a sponsor to secure land in Guldala close to the airport fence indicated that legalisation of property was more of a concern than airport noise for community members with whom they have interacted.

### **Community engagement on the protection and safety zones**

- 8.3.81 The identification and formalisation of the above zones is important to community members for a range of reasons depending on whether the structures on neighbouring properties have been constructed with or without the required permits. During the public consultation for the 2022 ESIA, a major concern was the establishment of the SPZ and the households that would be part of it. Many community members had been living in their houses for more than 30 years because the Guldala community has existed since the 1980s. It was indicated in the public consultation meeting that the overall approach is for the SPZ to minimise influx of new residents, while maintaining the status quo for the existing properties. In May 2022, a working group was formed to discuss the establishment of an SPZ and a PSZ.
- 8.3.82 ALA has a community liaison team that keeps a summary stakeholder engagement log. In 2023, engagement activities focused on the previous construction activities (covered by the 2022 ESIA). In 2024, discussions with communities were organised to discuss and address operations relating to noise and the airport's noise insulation programme (NIP) available to households known to be exposed to more than 60dB(A). The objectives and implementation of the NIP were shared with the intention of households volunteering to partake and benefit from the airport funded house renovations. Aimed at helping to muffle and minimise noise disturbances, the renovations included installation of triple-glazed windows and roof insulation.
- 8.3.83 While ALA was engaging with community members about the NIP from mid-2024 onwards, the akimats were also holding meetings that discussed airport created disturbances. In October 2024, the Guldala rural area akimat arranged a public hearing with residents to present information about establishing an SPZ as part of a new master plan. In December 2024, there was also a meeting with representatives of the Ministry for Transport, sanitary epidemiological control committee (part of Ministry of Health), laboratory and Air Astana to discuss the establishment of a final SPZ around the ALA area. Furthermore, the akimat of Almaty had previously raised the possibility of needing to relocate houses to protect residents and these topics resurfaced in December 2024. Since the beginning of 2025, ALA staff have been meeting with government entities (Ministry of Transport, Ministry of Health, Ministry of Agriculture) along with the Almaty and Talgar akimats and their Land Relations offices to discuss the issues in an ongoing manner. In May 2025, a working group was formed to discuss the establishment of a SPZ and a PSZ. The working group is expected to continue to be key for obtaining an agreement on these protection zones.

### **Future baseline**

- 8.3.84 Even in the absence of the Project, it is likely that community growth in the area will continue, largely due to the existing presence of the airport. Urbanisation is a dynamic and ongoing process, and airports around the world are widely recognised as catalysts for regional development. They often serve as strategic hubs that attract investment, stimulate infrastructure expansion, and encourage residential and commercial growth. In this context, the airport's influence is expected to remain a key driver of urban expansion in the surrounding areas.

## **Potential impacts**

- 8.4.1 People in the neighbouring communities will be affected by the following impacts and risks:
- Generation of procurement opportunities

- Construction disruption to existing businesses in and around the airport
- Creation of nuisance and disturbances to nearby communities during construction
- Construction phase community safety and security risks
- Localised economic development
- Community disturbance from increased air traffic (especially noise) and road traffic
- Definition and enforcement of the protection and safety zones
- Operational phase community safety and security risk

8.4.2 These impacts and risks are assessed in more detail in the following sections, organised by construction and operational phases.

## 8.5 Assessment of effects

### Construction phase effects

#### Generation of procurement opportunities

- 8.5.1 During the construction phase the Project will need to purchase supplies and materials, equipment, goods and various services. This will create opportunities and revenue for local, regional and national suppliers and service providers, especially for those who receive longer term contracts, as part of the supply chain. For example, opportunities will be available for suppliers of construction materials, plant and equipment. Goods and services that can be procured locally during the construction phase include office equipment and furniture, stationery and office supplies, some worker accommodation, worker transportation, catering, cleaning and laundry, security services, vehicle maintenance, oil and fuel, printing, etc. If these contracts are provided to local companies and businesses within the indirect area of influence, as is anticipated, this could help to benefit the local economy. Spending on goods and services by construction workers who will generate disposable income as a result of the Project and will have the ability to spend more money in the local economy will also induce a small temporary economic effect within the indirect area of influence.
- 8.5.2 Overall, the procurement of goods, equipment and services by the Project will be a beneficial impact to local suppliers from within the indirect area of influence, which are considered to be of **low** sensitivity as Almaty Region has a full range of products and services commensurate with an urban metropolis that it represents. Across the Almaty Region, there will be a range of other projects, schemes and activities generating access to similar opportunities. The magnitude of this impact is considered to be **minor** as it will be largely restricted to the construction phase and therefore temporary. Therefore, combining sensitivity and magnitude makes this a **beneficial minor** effect and **not significant**.

#### Disruption to existing businesses in or around the airport

- 8.5.3 Businesses operate within the airport, such as shops or restaurants in the terminals, airlines or suppliers to airlines (such as catering), and third-party organisations providing airside services. Impacts on these businesses resulting from the construction works are expected to be minimised, as activities will be confined to designated areas that do not interfere with airport operations. The construction activities will primarily take place outside the airport terminal area, which is expected to limit direct disruption to businesses operating within the airport itself.
- 8.5.4 During the construction phase, increased traffic from workers, machinery, supply trucks, and construction vehicles is expected to cause increased congestion around the airport. This may hinder customer access to nearby businesses, potentially reducing footfall and sales. Additionally, in connection with the construction of the parking area, elevated levels of noise and air pollution could deter customers from visiting businesses in close proximity, prompting them

to seek alternatives further away. However, the works on improving the parking for airport users will be temporary and the steady flow of passengers is expected to continue. On the plus side, the concentration of construction workers may generate new demand for localised services such as food, retail, and to a lesser extent accommodation.

- 8.5.5 Overall, businesses in or around the airport are considered to have a **low** sensitivity to construction disruption, with a **minor** impact magnitude. Overall, this is a **minor adverse** effect and **not significant**.

### Creation of nuisance and disturbances to nearby neighbourhoods during construction

- 8.5.6 People in the closest communities within the immediate area of influence of the airport boundaries are unlikely to be affected by noise and vibration generated by the construction activities at site. The main construction activities (runway, fuel farm, catering facility) will occur more to the centre of the airport property than at its boundaries. The noise from the construction activities is anticipated to be less severe than the noise that is generated by aircraft traffic which will be ongoing during the construction activities. If noise from construction activities is perceived by community members, it will be temporary, intermittent, and during daytime working hours. Refer to **ESIA Chapter 11: Noise** for more details.
- 8.5.7 Construction activities, such as demolition, groundworks and foundations, storage, and transport of materials will generate dust and air emissions. As mentioned above, the works will be undertaken within the airport property. Already there are buffer areas close to the boundaries which should help protect people in closest residential areas and hotel guests as well as businesses operating in the immediate vicinity from being directly affected. Refer to **ESIA Chapter 5: Air quality** for more details.
- 8.5.8 There will be some traffic impacts on road users and houses, particularly along Mailin Road (the primary access road to the airport) close to Nurshashkan neighbourhood, due to construction traffic carrying materials, plant and equipment and workers to and from the site. The intention is to avoid residential streets where possible, but workers and airport visitors may be led by transportation apps through communities if the arrival time is shorter and if parking is shown as available. Refer to **ESIA Chapter 12: Traffic and transport** for more details. Construction activities and the presence of construction workers generate waste that needs to be managed. Refer to **ESIA Chapter 13: Waste and resources** for more details.
- 8.5.9 ALA's grievance log from construction activities in 2023 and 2024 provides an indicator of the types of community nuisance issues that previously arose which can be mitigated. Four grievances between February 2023 and June 2024 from residents in various locations (Turksib, Panfilovo) raised construction phase concerns about:
- Parking issues caused by airport employees parking in residential areas (the grievance log indicates that more shuttle buses and routes were provided to encourage employees to not use their personal cars).
  - Unpleasant interactions with airport employees.
  - Environmental issues like increased trash and noise from airport construction.
  - Neglected maintenance in public areas.
  - Complaints about airport service buses creating noise and pollution in residential zones
- 8.5.10 Waste dumping (the grievance log indicates that some was not related to airport workers but that awareness sessions with workers were undertaken with employees). The noise, air, traffic and waste disturbances will affect the same neighbouring communities at the same time (i.e. during the construction phase) creating a cumulative impact. Residents in the immediate area of influence are considered to be highly sensitive to the construction period nuisances as they are already under the noise influences of the ongoing ground operations and aircraft landing/take

off activities at the airport, as well as congested traffic on Mailin Street and small industries within close proximity to the Project. The area around the airport has already experienced extensive urbanisation and construction activities over the previous years. Taking into account the temporary nature of the construction works on site the magnitude of the community disturbance impact is considered to be minor. Combining **high** sensitivity with **minor** magnitude, makes the cumulative construction nuisance and disturbances a **moderate adverse** effect, and hence **significant**.

### Community safety and security risks

- 8.5.11 Community safety risks relating to construction activities, such as exposure to heavy equipment, trip and fall hazards, falling objects, materials and chemicals, electrical hazards and use of tools and machinery will be minimised because the works will be undertaken within the airport boundary.
- 8.5.12 The construction areas will have restricted right of entry within the operational airport site, making it difficult for community members or animals to randomly access, presenting a low security level. Although the probability of community members being directly affected by the construction activities is extremely low, the contractors must have a Construction Environmental and Social Management Plan (CESMP) in place to prevent and protect community members from the construction activities and an Emergency Preparedness and Response Plan (EPRP) in place to prepare and respond to unforeseen or emergency incidents.
- 8.5.13 With regards to security management, there is already existing security and access procedures for the airport. However, the Engineering, Procurement and Construction (EPC) Contractors may have some small number of security staff. For instance, YDA's (EPC responsible for the construction of several Project components including the full depth reconstruction of the main runway, new taxiway, new cargo apron, full depth reconstruction of existing VIP apron, new de-icing pad, and rehabilitation of parking stands) staffing schedule identifies having a security manager.
- 8.5.14 As mentioned in the methodology section, no significance is attributed to community risks, but management measures are identified.

### Operational phase effects

#### Localised economic development

- 8.5.15 Almaty airport can significantly drive localised economic development by acting as a hub for employment, business growth, and tourism. Once the operational phase starts, direct jobs will be created within the airport itself as well as indirect and induced employment in sectors like hospitality, retail, and transportation<sup>25</sup>. The need for skilled workers in aviation and related industries can lead to the development of training programs and educational institutions, further contributing to the region's economic vitality. The creation of new employment opportunities may attract individuals to relocate to Almaty, thereby contributing to the city's development through the construction of new residential buildings and the expansion of local services. As more people settle and establish their lives in Almaty, including starting families, this population growth supports the city's overall economic and social advancement.

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<sup>25</sup> Based on figures at [Facts & figures | ATAG](#), 11.6, for every one direct airport job, 1.75 indirect jobs generated through the purchases of goods and services from companies in the air transport industry supply chain; and 1,48 induced jobs from industry employees spending of wages.

- 8.5.16 To date, the KIIs have provided positive feedback on the employment and service contributions provided to the neighbourhoods surrounding the airport. Internationally, there is also analysis that positively represents the impact of airports on local economies<sup>26</sup>.
- 8.5.17 Improved connectivity makes the area more attractive to national and international businesses, especially those that rely on fast logistics. Also, it stimulates tourism by making Almaty more accessible, which benefits local hotels, restaurants, and cultural attractions. Additionally, the airport will support trade by facilitating air cargo transport, encouraging the growth of logistics hubs and distribution centres. In light of the above considerations, the sensitivity of the economy is assessed as **low**, while the magnitude of the impact is considered to be **high**, creating a **beneficial moderate** effect which is **significant**.

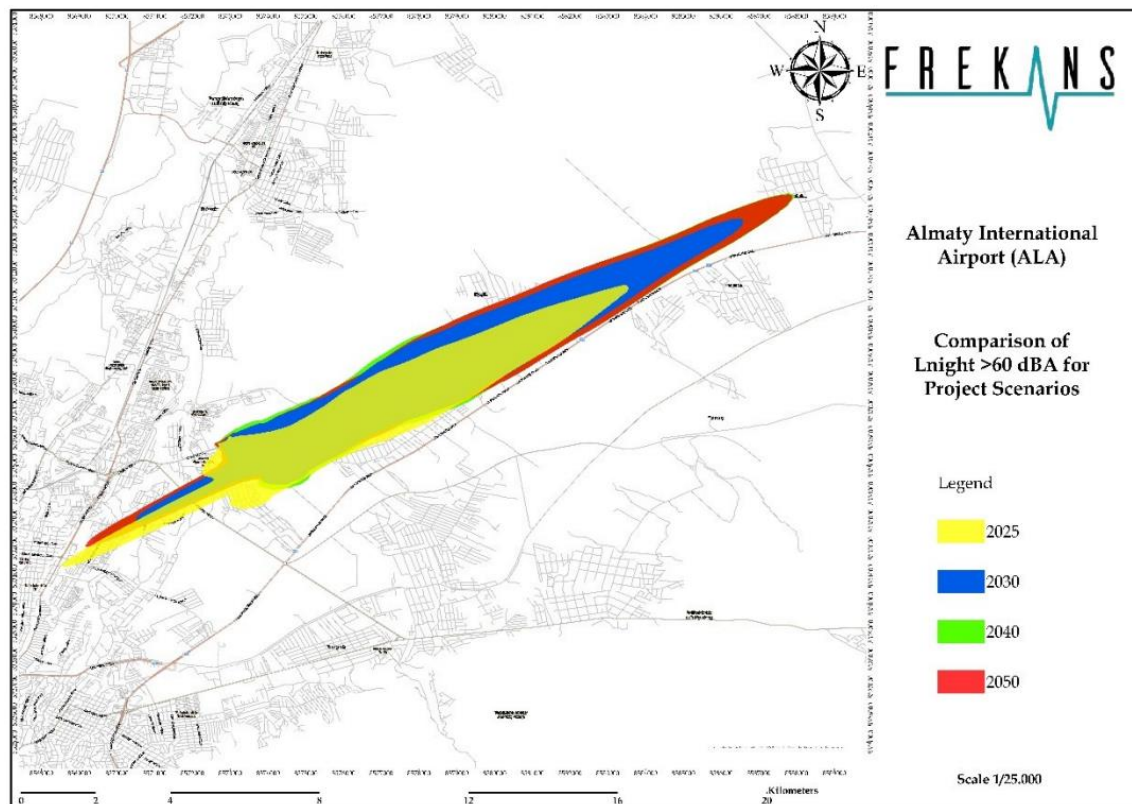
#### **Community disturbance from increased air traffic (especially noise) and road traffic**

- 8.5.18 Once the operational phase of the Project commences and the newly constructed runway becomes functional, a notable increase in air traffic to and from Almaty is anticipated. This additional runway, located to the north of the existing one, will mean noise impacts are further away from households in Guldala, which is adjacent to the south of the airport. However residential areas such as Almerek and Panfilovo that are located to the north-east of the airport along the take-off and landing routes of the new runway are expected to be exposed to heightened noise levels from increased air traffic. With the new runway the intention is to preference east to west flights paths. The overall spatial area affected by airport traffic noise will increase and move north (refer to Figure 8.15), further away from current residential areas. Refer to **ESIA Chapter 11: Noise** for more details.

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<sup>26</sup> See for instance "The impact of airports on local economies" written in 2024 at [The Impact of Airports on Local Economies](#) which positively reflects on the abilities of airports to create jobs and employment opportunities directly and indirectly, boost local tourism and support business travel, act as a trade and logistics hub, and leads to significant infrastructure develop and urban growth. The article also mentions that they bring challenges to sustainable growth whereby environmental and social impacts such as noise, air quality, and land use which affect local communities need managing. The website [The Economic Impact of Airports | Airport Gurus](#) cites many of the same arguments and states that research shows that for every million passengers, airports can create 2,000 to 4,000 jobs in various roles, from pilots and air traffic controllers to ground crews, security personnel, office staff, maintenance teams, and retail workers.

**Figure 8.15: Comparison of Night > 60 dB(A) for Project Scenarios**



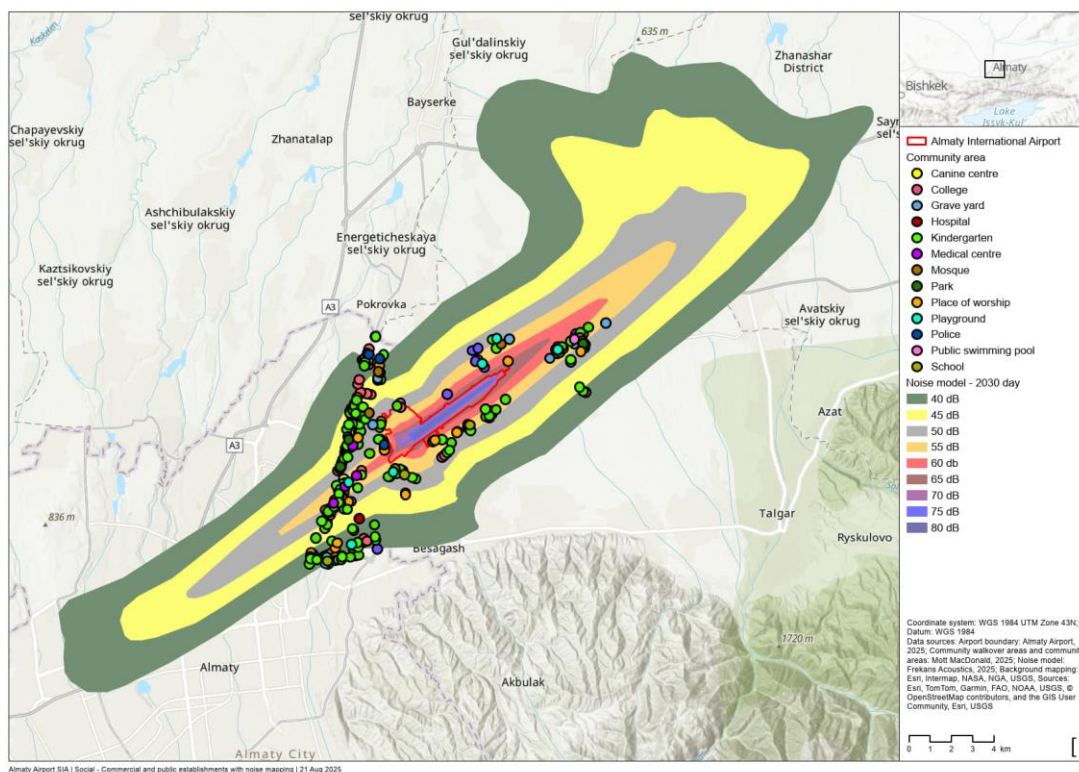
Source: Frekans 2025

#### 8.5.19

Figure 8.16 identifies the noise modelling conducted by Frekans for the year 2030 and the community infrastructure identified in the walkover. Refer to the baseline section on community infrastructure. It is evident that several community facilities across different neighbourhoods will be affected by elevated noise levels. Among these, six commercial establishments are expected to be affected by daytime noise levels exceeding 60dB(A), and four during nighttime. These include two businesses, two pharmacies, one restaurant, and one parking facility. Additionally, six community facilities will be impacted during the day and four at night by noise levels above 60dB(A). These community facilities include two kindergartens, one graveyard, one place of worship, one medical centre, and one playground.



**Figure 8.16: Community facilities affected by noise in 2030**



Source: Mott MacDonald, 2025

8.5.20 In addition to the rise in air traffic, the increased utilisation of the airport is expected to result in a higher volume of road traffic in and around the airport vicinity. This concern was echoed by the director of School #44 in Turksib, who reported a noticeable increase in traffic in the area following recent airport developments. She also highlighted that the noise has been disruptive to students, a sentiment shared by the principal of School #33 in Panfilovo as well as by the principal of school #21 in Talgar<sup>27</sup>. The noise particularly affects important lessons such as physical education, which are conducted outdoors, potentially impacting the children's health and well-being. The growth in passenger numbers will naturally lead to a greater demand for taxis and other forms of public transport. Furthermore, there will likely be a significant increase in the number of private vehicles, particularly those used by airport staff and other service providers. Given that traffic congestion is already a major concern in Almaty, it is expected that many drivers will continue to use alternative routes through residential neighbourhoods in an effort to avoid the heavily congested main highways.

8.5.21 One of the neighbourhoods most vulnerable to this increase in road traffic is Nurshashkan, situated to the west of Guldala. This area is already experiencing pressure from through-traffic, and the anticipated rise in vehicle numbers could exacerbate existing issues, potentially affecting the quality of life for local residents. A metro stop at the airport has been planned but could take at least a decade before it is functioning (refer to **ESIA Chapter 12: Traffic and Transportation** and **ESIA Chapters 16-17: Cumulative assessment and ESMF** for more details). Like in many places, residents and road users are forced to become accustomed to traffic congestion and add in travel time.

<sup>27</sup> Principals from schools #44 and #21 also reported internet disruptions caused by aircraft flying over the schools, which they noted significantly interrupts the learning process.



- 8.5.22 The individuals who will be impacted by the noise and disturbance from increased air traffic and road use are already considered vulnerable because of existing exposure to these effects, hence they are categorised as **high** sensitivity and the magnitude of impact is **major** because of the number of people in different neighbourhoods who will be affected. This results in a **major adverse** effect which is considered **significant**.

#### Definition and enforcement of the protection and safety zones

- 8.5.23 As mentioned above in Section 8.3 under 'Discussions on protection and safety zones for communities', protection and safety zones are being discussed. At this stage the mostly likely to proceed is the SPZ, possibly for 500m from the runway, leaving existing properties as they are and prohibiting residential development on other properties in that area. This is particularly critical for the neighbourhoods surrounding the airport - especially Almerék and Guldala - where new residential developments are currently underway. Current discussions appear to be focused on the establishment of a SPZ rather than a PSZ.
- 8.5.24 With the full depth reconstruction of the second runway, the boundaries of the aerodrome vicinity (which is an administrative delimitation prescribed by the RoK) may need to be modified, as the regulations stipulate a 4km radius from the nearest point of the runway and a 15km radius from the airport's control point. Given the ongoing expansion of residential neighbourhoods in the vicinity of ALA, it is reasonable to assume that this number has increased considerably by 2025.
- 8.5.25 Should protection and safety zones be formally established in response to the anticipated intensification of airport operations, the implications for urban development could be significant. Not only would this likely halt further residential and commercial development in the surrounding areas, but it could also place the legal status of existing properties within the zones into question. For instance, the Panfilovo akim suggested in the KII that the start of construction works may result in the development of sanitary, environmental and legal restrictions that could prevent the legalisation of housing and the construction of new houses.
- 8.5.26 The establishment of zones may affect property rights, planning permissions, and the ability of residents to make improvements or sell their homes, thereby creating uncertainty and potential socio-economic challenges for affected communities. At the same time, the establishment of the SPZ will provide clarity for those who have been involved in these discussions for some time and provide protection to community members over the long term. The individuals affected are considered vulnerable due to their exposure to noise. Those with compromised legal status of their housing are more vulnerable. Consequently, the sensitivity of the groups of affected people is assessed as **high**, and the magnitude of the impact is considered **major** because of the number of people affected in different neighbourhoods. Combining sensitivity and magnitude results in a **major adverse** effect which is considered **significant**.

#### Community safety and security risks

- 8.5.27 The WBG Environmental, Health, and Safety (EHS) guidelines for airports identifies issues that can potentially affect local communities including the highly infrequent, but potentially catastrophic, failure of aircraft during the landing and take-off cycle. The EHS guidelines require airport operations to develop and implement a safety management system to identify and correct unsafe conditions. Because the airport is already operational, management measures (risk assessments, policies, plans, procedures, staff, responsibility definitions) related to safe practice are in place and aligned with the International Civil Aviation Organisation (ICAO). For the last three years, the Lenders' Environmental and Social (E&S) Advisor has been undertaking monitoring to verify compliance performance with the EBRD ESRs and IFC PSs.

The monitors have praised the experience and capacity of TAV<sup>28</sup> as an international airport operator, indicating that ALA staff are reaping benefits from that guidance, gaining their own experience and understanding of international standards, and generally improving their abilities and skills to manage environmental and social related impacts and risks.

- 8.5.28 A key component of the Project is the fuel farm storage expansion and improvements to the existing fuel farm. The fuel farm is located within the airport boundary, 654m from the closest residences. The airport already has in place a system to inspect fire safety systems including fire detection and alarm, accessibility of exits and evacuation signalisation, smoke extraction, and automated fire-fighting equipment. The design of new buildings will follow the NFPA101, the Life Safety Code developed by the National Fire Protection Association in the United States - Fire Safety Codes for buildings accessible to the public. As mentioned, the airport already has management measures for a full range of emergencies in place. They stage drills to practice response.
- 8.5.29 Identified security risks during operations relate to:
- Drug trafficking, human trafficking, smuggling or other illicit activity facilitated by airport traffic
  - Harm caused through the use of inadequately trained security personnel who may inappropriately use force or weapons, abusing their power and the human rights of local community members
- 8.5.30 The airport already has key responsibilities for the safety of passengers against the consequences of unlawful acts. The airport has private and public security forces in place who are part of a security system with procedures to prevent and respond to security concerns. None of the new Project components are expected to warrant changes to the existing security system.
- 8.5.31 As mentioned in the methodology section, no significance is attributed to community risks, but management measures are identified.

## 8.6 Mitigation

- 8.6.1 This section describes the mitigation, enhancement and monitoring measures that will be taken to manage the impacts and risks of the Project.

### Construction management

#### Promote local economic participation

- 8.6.2 To enhance the positive economic effects during the construction phase, the Project will actively promote the participation of local businesses and service providers in the procurement of goods, materials, and services. The concept of “local content” is about increasing the input of local labour, goods and services in the delivery of infrastructure projects to provide benefits and value to the local communities and host country. This can be achieved by encouraging the use of subcontractors, service providers and suppliers from within the direct and wider area of influence wherever feasible. By doing so, the Project can help stimulate the local economy, support job creation, and strengthen local supply chains.

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<sup>28</sup> ALA is an airport operated by TAV Airports. TAV Airports, is a global airport operator operates a portfolio of 15 airports in eight countries, in which ALA is included.

8.6.3 Ways that the EPC contractors can encourage local companies' involvement in the construction activities include<sup>29</sup>:

- Deliver information on purchasing policies and upcoming contracts available as early as possible, to allow local businesses adequate preparation time
- Provide longer deadlines to assist small and medium enterprise responses
- Divide supply contracts into smaller work packages or requests, to encourage greater local competition and the participation of small or family businesses when possible
- Shape contracts to make them compatible with the capabilities of local businesses or set aside contracts or specific work packages that are only directed to local companies
- Offer technical assistance and training to local contractors with sufficient time to be prepared for the tenders
- Encourage outside contractors to partner with local businesses when awarding contracts
- Organise longer contract periods to justify acquisition of capital equipment or identify other ways to assist potential contractors in acquiring credit to purchase equipment that may be needed for use
- Provide support for local businesses to draft their company profiles
- Pay invoices in agreed shorter time frames to help small local companies manage their cash flow

8.6.4 The EPC contractors will need to appropriately advertise procurement opportunities and avoid sole sourcing by identifying options. Already it is known that YDA intends to rent some local accommodation. Typical services provided by local companies also include catering, personal protective equipment (PPE) and safety material provision, equipment and vehicle rental, and construction material supplies. ALA will require the EPC contractors to report quarterly on their procurement activities and local content results.

**Provide business access and engage with affected business**

8.6.5 To minimise disruption to businesses operating within and around the airport during the construction phase, the EPCs will produce and implement traffic management plans (TMPs) that include any required action or strategies to maintain clear and consistent access routes for travellers, customers, suppliers, and employees to businesses inside and around the airport, particularly during peak hours. Temporary signage, TMPs, and coordination with local authorities should be used to reduce congestion and promote safe and efficient movement around construction zones.

8.6.6 Additionally, regular and timely communication via ALA with affected businesses will be established to inform them of construction schedules, anticipated disruptions, and available support measures. Where feasible, efforts will be made to schedule high-impact activities during off-peak hours to reduce interference with business operations. By proactively managing access and maintaining open lines of communication, the Project can help mitigate short-term disruption while supporting the resilience and continuity of local businesses throughout the construction period. While efforts will be made to maintain access, the grievance mechanism will be available for local businesses to use if they need to report any specific situations that need rectification.

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<sup>29</sup> Based on Engineers Against Poverty's local procurement guidance. The information is from previous versions no longer readily available however a newer version is available at: [Local\\_content\\_briefing\\_note.pdf \(engineersagainstopoverty.org\)](https://engineersagainstopoverty.org)

### **Produce Construction Environmental and Social Management Plans (C-ESMP)**

- 8.6.7 To manage (mitigate, enhance and monitor) impacts and risks, this ESIA includes an appropriately tailored Environmental and Social Management Plan (ESMP) to reflect the current scope, scale, and context of construction activities. The ESMP will include measures or sub-management plans to minimise the combined effects of noise, air emissions, traffic congestion, waste generation, and social disruption to the communities surrounding the airport. The ESMP from this ESIA acts as a framework for the EPCs to develop their scope and location specific C-ESMPs
- 8.6.8 Construction activities will be carefully scheduled to occur during daytime hours, (i.e. no nighttime work will be allowed) with efforts made to reduce noise and dust through appropriate equipment and suppression techniques. Refer to **ESIA Chapter 11: Noise** for more details on noise management and **ESIA Chapter 5: Air Quality** for more details on dust suppression.
- 8.6.9 Each EPC will need to produce and implement a TMP to outline routes for equipment deliveries, personnel transportation, strategies to minimise congestion and to coordinate with local authorities, including if needed some restrictions on residential streets. Refer to **ESIA Chapter 12: Traffic and transport** for more details on the TMPs.
- 8.6.10 Waste generated by construction and workers will be managed by EPC contractors adhering to the construction waste management plan. Workers will receive training on the plan and toolbox talks to prevent illegal dumping and maintain cleanliness not only around the site, but in their interactions with the neighbourhoods around the airport. The linkage between maintaining cleanliness around the site and health and safety measures to prevent the spread of communicable diseases will be emphasised. **ESIA Chapter 13: Waste and resources** on waste provides more details.
- 8.6.11 By integrating these measures into ALA's environmental and social management system, and in particular its construction monitoring programme, the Project can reduce the overall burden on neighbouring communities, mitigate conflict or dissatisfaction, and maintain a constructive relationship with them throughout the construction period. While efforts will be made to avoid nuisance and disturbance, ALA does have its grievance mechanism which will be communicated so that community members may identify any feedback or specific circumstances relating to the management of nuisance effects.

### **Manage and monitor construction phase community safety and security risks**

- 8.6.12 To mitigate community safety risks associated with construction activities—such as exposure to heavy machinery, trip and fall hazards, falling objects, hazardous materials, and electrical equipment—the Project will confine works within the boundaries of the airport. Construction zones and hazards will be clearly demarcated, and access will be strictly controlled, significantly reducing the likelihood of unauthorised entry by community members.
- 8.6.13 The EPCs will be required to use the ESMP that is part of this ESIA as a framework to produce and implement an activity and location specific C-ESMP. This plan will include provisions to prevent and manage potential risks to the community, alongside an EPRP to support readiness and appropriate action in the event of unforeseen incidents. These measures will collectively help to uphold safety standards and protect the wellbeing of nearby residents throughout the construction period.
- 8.6.14 Each EPC will be mandated specific construction site security limits which are their responsibility to maintain. The use of security personnel will be carefully managed. Private sector security staff that EPCs employ will not be allowed to be armed. The staff will need to be vetted for previous infractions. Security personnel will need to be trained on human rights, use of force, community-sensitive approaches, the workers' code of conduct, relevant parts of the

airport security system, and the Project's EPRP. Security personnel of the EPC contractors and subcontractors must also receive training on sexual exploitation, abuse and harassment (SEAH) and gender-based violence (GBV).

- 8.6.15 As occurred during the previous construction activities, the EPCs will be required to produce an EPRP for their specific activities and locations. The EPRP will need to meet international requirements covering the legal and policy framework, a hazard and risk register, responsibilities including for communication, emergency materials and supplies (fire extinguishers, medical, water, electricity, other), emergency preparedness (staff training, drills, evacuation planning), emergency response (to fire, flooding, severe weather, terrorism, a critical accident, labour unrest, explosion, other), and restoration clean up, remediation, return to work. The construction EPRP will need to take into account and coordinate with ALA's existing EPRP which focuses on national requirements.
- 8.6.16 ALA's community grievance mechanism will be disclosed for community concerns to be addressed promptly and transparently, supported by regular engagement with residents to provide updates and gather feedback. Finally, ALA must clearly define the environmental and social roles and responsibilities of its management and personnel throughout both the construction and operational phases of the Project, to promote effective implementation and accountability.

## Operational mitigation

### Enhance economic development

- 8.6.17 To support local development during the operational phase, the CLO at ALA needs to actively contribute to tourism campaigns initiated by the government, as well as other initiatives aimed at promoting regional economic growth. The akimats of both Turksib and Guldala referenced in the KILs that with the growing importance of the airport, there is a need to develop the accompanying urban infrastructure. These efforts should particularly focus on leveraging the strategic role of the airport as a gateway to the region, enhancing its potential as a driver of sustainable economic and social development.
- 8.6.18 In addition to supporting tourism, the CLO could facilitate partnerships between local businesses and airport services, promote local products and crafts within airport retail spaces, collaborate with educational institutions to develop training programmes aligned with airport-related employment opportunities, and organise cultural events or exhibitions that showcase the region's heritage to travellers. According to the interview conducted with the principal of Panfilovo #33 School, a significant number of pupils choose to enrol in the aviation college after completing their studies. This trend appears to be influenced by the presence of the nearby airport, as many students aspire to secure future employment there. The college may represent a valuable partner for developing a local workforce or for delivering training programmes. Furthermore, the CLO could engage with local authorities and civil society organisations to facilitate that development initiatives are inclusive and responsive to community needs, thereby reinforcing the airport's role as a catalyst for long-term regional prosperity.
- 8.6.19 As an example to reinforce this idea, Panfilovo akim said that specific forms of social support are expected to be developed by the airport. He noted that when local initiatives—such as the development of sports halls, playgrounds, or public spaces<sup>30</sup>—are supported by the airport or

<sup>30</sup> Panfilovo akim suggested that the situation could be improved through the development of facilities such as a children's gym, playgrounds, and parks. He noted that although a gym exists in the village of Tonkeris, children currently train inside a shop due to the lack of proper infrastructure. In the past, playgrounds and recreational areas were constructed by the community itself; however, a master plan for the district's development has since been prepared. While this plan includes new parks and public spaces, some of the designated land has already been transferred into private ownership.

other major enterprises as part of their social responsibility, public trust tends to be reinforced and community perceptions are positively shaped.

- 8.6.20 Another example was provided by the district police inspector of Guldala, who highlighted the urgent need to install surveillance cameras in the fence area to help enhancing public safety due to the lack of police officers in the neighbourhood.

#### **Mitigate community disturbance from increased air and road traffic**

- 8.6.21 To mitigate the anticipated moderate adverse effects on residential communities surrounding the airport—particularly Almerek, Panfilovo, Guldala, Turksib, and Nurshashkan—the Project will implement the airport's ESMS with a targeted set of plans and procedures aimed at managing the effects of increased air traffic and road traffic. In parallel, the Project will coordinate with local authorities<sup>31</sup>, to improve traffic flow and reduce congestion on key access routes, including Mailin Road while discouraging the use of residential streets through signage and digital navigation updates.
- 8.6.22 Noise mitigation measures will focus on the implementation of the NIP which is likely to be expanded. The NIP has staff and resources. The uptake of the NIP since the last quarter of 2024 has been considerable. Currently the NIP is focusing on people who volunteer to participate, some who may be vulnerable and some who may not.

#### **Define and enforce any agreed protection and safety zones**

- 8.6.23 It appears that discussions are leading to the identification of one SPZ rather than a PSZ or ASZ. The working committee needs to continue meeting to clearly define what the SPZ distances should be and how enforcement will be guaranteed. The SPZ will likely be a compromise that takes into account physical safety, well-being/health/sanitary protection, and formal property rights preservation. ALA needs to continue with its contributions. Once a decision is made and the proposal for the SPZ is transformed into law or regulations, ALA will need to respond accordingly with any corporate positions or procedures in adherence.
- 8.6.24 More attention is required by local and planning authorities for reviewing proposed development permitting requests and monitoring for constructions without permits. ALA's inputs and analysis of specific proposed developments need to continue, and it would be useful if their feedback could have more bearing on local planning.
- 8.6.25 While Kazakhstan does not have an ASZ defined in its legislation, instead it has an aerodrome vicinity based on the runway. When the runway changes, the aerodrome will also need to change.

#### **Disclose information, consult and manage grievances**

- 8.6.26 This ESIA assignment updates the current Stakeholder Engagement Plan (SEP). The implementation of the comprehensive SEP is designed to guide ongoing, transparent communication with interested and affected parties, especially neighbouring communities. The SEP will include regular updates on flight path changes, traffic management strategies, and operational schedules, as well as opportunities for residents to provide feedback and raise concerns. By maintaining open lines of communication and proactively addressing concerns, the Project can help build trust with local residents and reduce the risk of dissatisfaction or conflict, thereby enhancing the overall social sustainability of the airport's expansion. The

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<sup>31</sup> According to the Turskib District Police Department Almerek police officer, preventive measures to avoid traffic accidents are being taken in the area by installing many speed control cameras along the Bukhtarminka and Mailin streets that lead the visitors into the city. Patrolling is more frequent along these streets too.

grievance mechanism will remain in place for community feedback. Monitoring grievance trends may also provide adaptive management strategies.

- 8.6.27 One KII respondent suggested the creation of a consultative body, council or commission, which would include representatives of the local council, environmentalists, and experts on safety, and on the impact of the airport. There should be a comprehensive plan to reduce the negative impact of airport activities. As well, a KII respondent expressed interest in hearing the results of the noise measurements, receiving independent experts' opinions on the results, receiving information about the construction plans and works in progress, and knowing independent experts' opinions on health impacts.
- 8.6.28 A different KII stated that a desire for openness and access to current information has been expressed by residents of the neighbourhood. When works or changes are planned by the airport, it is considered important that details regarding their nature, purpose, and potential consequences are communicated to the public in a timely manner. This approach is viewed as effective in reducing misunderstandings. He suggested that platforms for public feedback, including hearings, meetings, and surveys, are regarded as necessary to give residents a voice and to facilitate the joint resolution of local issues.
- 8.6.29 Another KII respondent suggested that the airport needs better logistical provisions for Umrah<sup>32</sup>. He indicated that, in his opinion, the airport has a prayer room, but it is too small for such events nor does it provide for women who have to pray separately. He suggested that the airport should also have space for luggage during prayer, and that worship spaces for other denominations (Christians, Jews) may also require adequate provisions.

#### **Manage and monitor operational phase community safety and security risks**

- 8.6.30 Although possible causes of aircraft failures are numerous and complex, the guidelines indicate that airport operators can help prevent them with:
- Airport design
  - Minimising the presence of birds and other wildlife which can increase the likelihood of strikes by aircraft (refer to **ESIA Chapter 6: Biodiversity** for more details)
  - Operational safety procedures of aircraft during landing, take-off, and ground operations, including adequate emergency response. Potential hazards can be managed through regular runway maintenance and monitoring to identify and remove non-permissible objects on the runways (e.g. metal or other parts that may have fallen from other aircraft on the runway or during maintenance activities).
- 8.6.31 In terms of design, a key new Project component has been to include a de-icing pad<sup>33</sup> to allow for adequate de-icing. In addition, aircraft inspections will be conducted regularly, including thorough checks and de-icing procedures to provide operational safety in cold weather conditions.
- 8.6.32 From the previous construction activities, a Lender commitment by ALA was to use a suitably qualified professional with certification to:
- Design the life and fire safety systems in accordance with an internationally accepted life and fire safety (L&FS) standard
  - Conduct a review, as part of the project completion test, at the time of the L&FS systems testing and commissioning and certify that the construction of these systems was carried out

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<sup>32</sup> The minor pilgrimage undertaken by Muslims when they enter Mecca.

<sup>33</sup> This recognises that a probable cause of the 2019 aircraft crash was relating to ground icing of the wings.

in accordance with the accepted design and the L&FS section of the WBG General EHS Guidelines

- 8.6.33 The same commitment will be required for this Project. Already the airport has in place a system to inspect fire safety systems including fire detection and alarms, accessibility of exits and evacuation signalisation, smoke extraction, and automated fire-fighting equipment. The design of new buildings will follow the NFPA101, the Life Safety Code developed by the National Fire Protection Association in the United States - Fire Safety Codes for buildings accessible to the public.
- 8.6.34 A flight safety assessment was produced in 2025 to determine the impact of construction works on aerodrome operations in terms of flight safety<sup>34</sup> and to develop measures to facilitate that an acceptable level of flight safety is maintained subject to the requirements of the NGEA GA RK<sup>35</sup> and ICAO. The assessment reviewed the works that will be undertaken and identified where and when restrictions on the movement of aircraft would be needed. It also identifies where some equipment and vehicles will enter the construction area within the airport boundaries. Reflective tapes and red lights (not air navigation ones) will need to be installed around the construction site. Control procedures for the execution of work in the movement area are identified. For the organisation of the construction work the assessment indicates that the EPC contractor is responsible for training/briefing staff in advance (airside safety, airside vehicle driving, post guarding, health and safety, firefighting and aviation security) and that some training can be provided by the airport on agreement. Briefings prior to construction works and pre-shift will be required on a full range of topics identified in the assessment. As well, notices to airstaff (NOTAM), which are official notifications issued by aviation authorities, will be used to inform pilots and aviation professionals about important information that may affect flight operations.
- 8.6.35 The current fuel farm does not meet international standards and improvements are needed. As discussed in **ESIA Chapter 2: Project description**, the fuel storage facilities will be designed, constructed and operated according to GIIP. The design is expected to take into account distances and bunding between individual tanks which is a current deficiency. A positive aspect is that there is already a buffer between the fuel storage area and adjacent buildings. Cooling water capacity is appropriate. Procedures for unloading the fuel that is delivered by road already exist. There is use of fail-safe control valves and emergency shutdown equipment.
- 8.6.36 Maintenance measures will need to include prevention of flooding and potential ignition sources, for instance to avoid static electricity buildup and lightning hazards, use of safe electrical installations and no-sparking tools, and implementation of work permit systems and procedures for any hot works. The above measures already and in the future will help prevent and control fire and explosion hazards. A fire current response plan exists, which includes identification of response roles and training. The training includes use of fire suppression equipment and evacuation. The new fuel farm will include fire suppression equipment such as portable extinguishers, specialised vehicles and fixed fire suppression equipment that meet internationally recognised technical specifications for the fuel stored at the facility. Once the fuelling area infrastructure is updated to a state-of-the-art facility, ALA will need to develop and implement a Major Accident Prevention Policy.
- 8.6.37 The WBG airport EHS guidelines indicate that the emergency plans should specifically address potentially catastrophic incidents such as aircraft crashes and fires, including a firefighting plan

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<sup>34</sup> Flight safety is a condition in which the risk of harm to life or health of people or damage to property is reduced to an acceptable level and maintained at that level or lower through a continuous process of identifying sources of hazard and controlling risk factors.

<sup>35</sup> Government of the Republic of Kazakhstan. (2012, January 23). Order No. 156 on Regulations of Serviceability of Airfields (Helidromes) of Civil Aviation of the Republic of Kazakhstan. Available at <https://caa.gov.kz/en/legislation-map-kazakhstan-civil-aviation>. Last access on 30 July 2025.



and training program, applicable to airport and aircraft emergencies. Currently ALA's EPRP is more aligned to national requirements, and it will need to be updated to meet international standards. The EPRP will need to include a full assessment of emergency services capacity to respond.

- 8.6.38 ALA has a security system in place to manage operational airport security risks. This security system will need to be updated to cover the Project.

## 8.7 Summary of residual effects

- 8.7.1 Residual effects after the application of mitigation are presented in Table 8.8.

**Table 8.8: Summary of residual effects for community**

| Description of effect                                                                                                                                                                                               | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Residual effect                    | Proposed monitoring                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction phase</b>                                                                                                                                                                                           |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                    |                                                                                                                                                                                                                |
| Construction disruption to existing businesses in or around the airport.                                                                                                                                            | Temporary              | Low                     | Minor               | Minor adverse (Not significant)                     | Develop and implement traffic management plan (TMP) to maintain clear access.<br>Communicate regularly and in a timely manner with affected businesses and support local services to facilitate business continuity and resilience.                                                                                                                                                                                                                                                                                                                                                 | Minor adverse (Not significant)    | Performance findings on TMP implementation<br>Number, type and timeliness of communications                                                                                                                    |
| Generation of positive procurement opportunities for local and regional suppliers.                                                                                                                                  | Temporary              | Low                     | Minor               | Minor beneficial (Not significant)                  | Prioritise local procurement<br>Provide transparent information on procurement opportunities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Minor beneficial (Not significant) | Quarterly reporting by EPCs on procurement efforts and local content use                                                                                                                                       |
| Creation of nuisance and disturbances to nearby neighbourhoods during construction                                                                                                                                  | Temporary              | High                    | Low                 | Moderate adverse (Significant)                      | Produce C-ESMPs that are activity and location specific and address the combined effects of noise, air emissions, traffic congestion, waste generation, and social disruption                                                                                                                                                                                                                                                                                                                                                                                                       | Minor adverse (Not significant)    | Performance findings on C-ESMP implementation<br>Number, type and resolution of grievances                                                                                                                     |
| Community safety risks related to construction activities, such as exposure to heavy equipment, trip and fall hazards, falling objects, materials and chemicals, electrical hazards and use of tools and machinery. | Not applicable (N/A)   | N/A                     | N/A                 | N/A                                                 | Confine construction work activities within airport boundaries and enforce strict access controls<br>Require contractors to develop and implement tailored safety procedures and emergency preparedness and control plans.<br>Require security personnel to be vetted and unarmed. Train security staff in use of force, human rights, community-sensitive practices, and emergency preparedness and response procedures.<br>Security personnel must also receive training on SEAH and GBV.<br>Conduct engagement with residents and a transparent grievance mechanism will support | N/A                                | Training schedule and training log on H&S and use of force and human rights and community-sensitive practices for security personnel.<br>Updated stakeholder engagement log and community grievance mechanism. |

| Description of effect                                                                                | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Residual effect                   | Proposed monitoring                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                      |                        |                         |                     |                                                     | safety, accountability, and responsiveness throughout the construction phase.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                   |                                                                                                                                                                                                                                                                                                |
| <b>Operational phase</b>                                                                             |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |                                                                                                                                                                                                                                                                                                |
| Drive localised economic development by acting as a hub for employment, business growth, and tourism | Permanent              | Low                     | High                | Moderate beneficial (Significant)                   | Support tourism campaigns, promote local products and training, and foster business partnerships through the CLO.<br>Participate in cultural events and link local services with airport needs.<br>Engage regularly with authorities and civil society regarding airport activities for community-driven development                                                                                                                                                                                                                                           | Moderate beneficial (Significant) | Corporate Social Responsibility (CSR) report reflecting activities conducted<br>Updated stakeholder engagement log                                                                                                                                                                             |
| Community disturbance from increased air traffic (especially noise) and road traffic                 | Permanent              | High                    | Major               | Major adverse (Significant)                         | Implement the airport's ESMS and coordinate with authorities to manage traffic and reduce congestion. Implement the Noise Management Plan (NMP).<br>Expand the NIP in phases, offering insulation upgrades to eligible households. Maintain community outreach, clarify eligibility (including for informal housing), and adapt the programme based on lessons learned.<br>Target families of children in the AoI with NIP information and awareness via schools.<br>Assess how education and health facilities can be supported by the NIP to suppress noise. | Moderate adverse (Significant)    | Noise monitoring according to the NMP.<br>Updated NIP programme, showing the numbers for beneficiaries' houses<br>Updated stakeholder engagement log showing NIP engagement activities and meetings with local authorities, households with children, and local schools and health facilities. |
| Definition and enforcement of the SPZ                                                                | Permanent              | High                    | Major               | Major adverse (Significant)                         | Continue ALA's participation in defining the SPZ and support its legal adoption.<br>Align internal procedures with the final SPZ regulations once formalised.<br>Monitor and provide input on local development proposals and encourage stronger enforcement against unpermitted construction.                                                                                                                                                                                                                                                                 | Moderate adverse (Significant)    | Meeting attendance records showing ALA's involvement in SPZ discussions<br>Internal policy updates reflecting SPZ requirements<br>Audit reports confirming implementation of updated procedures                                                                                                |

| Description of effect                                                                                                                                                                                | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Residual effect | Proposed monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                      |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | Records of coordination with local planning authorities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Community safety and security risks related to aircraft failure and operational safety incidents, alongside potential security threats such as trafficking or misuse of force by security personnel. | N/A                    | N/A                     | N/A                 | N/A                                                 | <p>Maintain wildlife control, runway inspections, and operational safety procedures to prevent aircraft hazards.</p> <p>Engage certified professionals to design and verify life and fire safety systems to international standards.</p> <p>Implement construction-phase flight safety controls, including staff training, site markings, and NOTAMs.</p> <p>Upgrade the fuel farm to meet international standards, with fire prevention systems and a Major Accident Prevention Policy.</p> <p>Update EPRP to align with international standards and assess emergency response capacity.</p> <p>Expand the airport's security system to cover new Project components.</p> <p>Conduct inspections regularly, including thorough checks and de-icing procedures to ensure operational safety in cold weather conditions.</p> | N/A             | <p>Daily inspection logs for runways and wildlife activity and incident reports.</p> <p>Inspection reports and maintenance logs for fire alarms, sprinklers, and suppression systems</p> <p>Site inspection reports verifying markings, barriers, and lighting as well as NOTAM logs showing timely communication of construction activities</p> <p>Third-party safety audits for the fuel farm</p> <p>Updated EPRP</p> <p>Training records, weekly toolbox talks and safety briefings</p> <p>Security system design documents covering new Project areas and security audits presenting the results</p> |

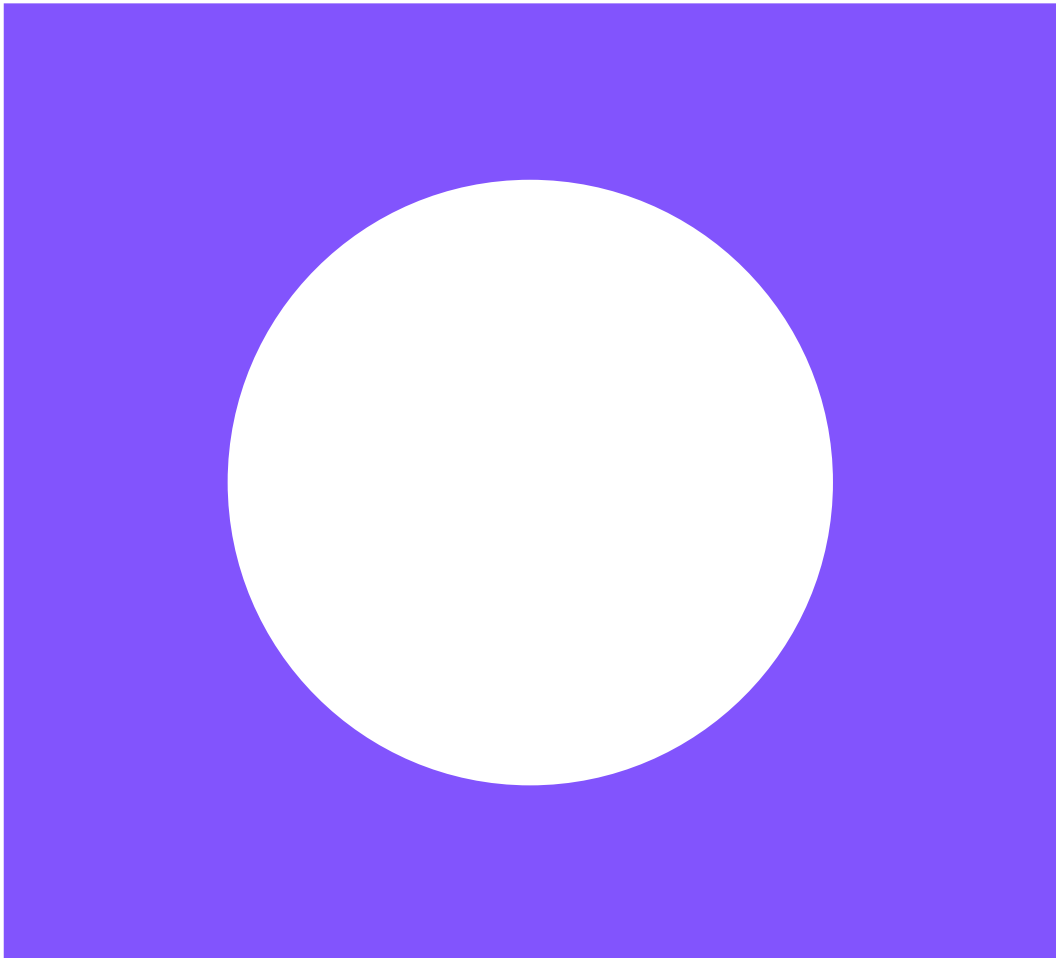
## Appendix 8.A: Hand brochure

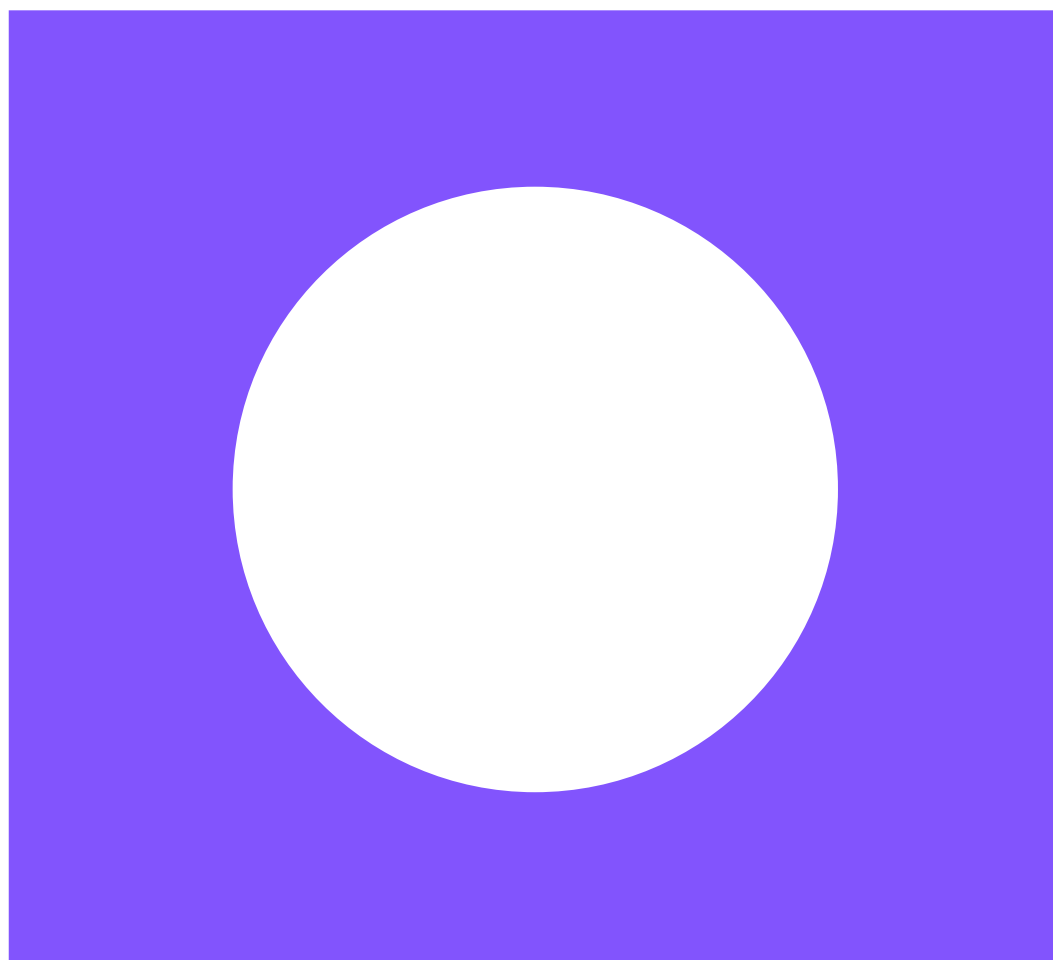


## Appendix 8.B: NIP Leaflet









# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 9

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 9**

September 2025

# Issue and Revision Record

| Revision | Date       | Originator | Checker | Approver | Description                                |
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|          |            |            |         |          |                                            |
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# Contents

|                                     |    |
|-------------------------------------|----|
| Acronyms and abbreviations          | 1  |
| 9 Geology and soils                 | 2  |
| 9.1 Introduction                    | 2  |
| 9.2 Methodology                     | 2  |
| Applicable guidelines and standards | 2  |
| Area of Influence                   | 2  |
| Methodological approach             | 3  |
| Limitations and assumptions         | 3  |
| 9.3 Baseline                        | 4  |
| Current baseline                    | 4  |
| Future baseline                     | 19 |
| 9.4 Potential impacts               | 19 |
| Seismic and natural hazards         | 20 |
| Land contamination                  | 20 |
| 9.5 Assessment of effects           | 20 |
| Temporary (construction) effects    | 21 |
| Permanent and operational effects   | 22 |
| 9.6 Mitigation                      | 22 |
| Seismic hazard mitigation           | 22 |
| Land contamination mitigation       | 23 |
| 9.7 Summary of residual effects     | 26 |

## Tables

|                                                                                                    |    |
|----------------------------------------------------------------------------------------------------|----|
| Table 9.1: Summary of PGA values in g recorded across different sources of literature or databases | 13 |
| Table 9.2: Summary of encountered geology                                                          | 16 |
| Table 9.3: Summary of potential contamination sources                                              | 18 |
| Table 9.4: Summary of contamination pathways                                                       | 19 |
| Table 9.5: Summary of receptors                                                                    | 19 |
| Table 9.6: Potential impacts in relation to land contamination from the Project                    | 20 |
| Table 9.7: Summary of residual effects for geology and soils                                       | 27 |

## Figures

|                                                                                                     |   |
|-----------------------------------------------------------------------------------------------------|---|
| Figure 9.1: Map of seismogenerative zones of Kazakhstan                                             | 5 |
| Figure 9.2: Clipping of map of seismogenerative zones around Almaty                                 | 6 |
| Figure 9.3: Tectonic setting of Almaty – showing faulting at a regional scale and at a local scale. | 7 |

|                                                                                                                                                                              |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 9.4: Seismic microzonation map given in terms of Peak Ground Acceleration (PGA) (g) and accounting for soil categories by seismic properties, and geotechnical zoning | 7  |
| Figure 9.5: General seismic zoning map of the territory of Kazakhstan in PGA for probability of exceeding 10% during 50 years (return period 475 years)                      | 10 |
| Figure 9.6: General seismic zoning map of the territory of Kazakhstan in PGA for probability of exceeding 2% during 50 years (return period 2475 years)                      | 10 |
| Figure 9.7: The Seismic Hazard Maps of the territory of Almaty city for probability of exceedance 10% in 50 years in PGA (recurrence period of 475 years)                    | 11 |
| Figure 9.8: The Seismic Hazard Maps of the territory of Almaty city for probability of exceedance 2% in 50 years in PGA (recurrence period of 2475 years)                    | 12 |

# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                            |
|------------------------|-------------------------------------------------------|
| ACMs                   | Asbestos-containing materials                         |
| ALA                    | Almaty International Airport                          |
| BGL                    | Below Ground Level                                    |
| BTEX                   | Benzene, Toluene, Ethylbenzene and Xylene             |
| C-ESMP                 | Construction Environmental and Social Management Plan |
| CSM                    | Conceptual Site Model                                 |
| DEM                    | Digital Elevation Model                               |
| DBE                    | Design Basis Earthquake                               |
| DIV                    | Dutch Intervention Values                             |
| DSHA                   | Deterministic Seismic Hazard Assessment               |
| ESIA                   | Environmental and Social Impact Assessment            |
| FFF                    | Fire Fighting Foam                                    |
| GEM                    | Global Earthquake Model                               |
| GSZ                    | General Seismic Zoning                                |
| MCE                    | Maximum Considered Earthquake                         |
| PAH                    | Polycyclic Aromatic Hydrocarbons                      |
| PCB                    | Polychlorinated Biphenyls                             |
| PFAS                   | Per and polyfluoroalkyl substances                    |
| PGA                    | Peak Ground Acceleration                              |
| PSHA                   | Probabilistic Hazard Assessment                       |
| SMZ                    | Seismic Microzoning                                   |
| TPH                    | Total Petroleum Hydrocarbons                          |
| UST                    | Underground Storage Tank                              |
| ZAF                    | Zailisky Alatau Fault                                 |



## 9 Geology and soils

### 9.1 Introduction

- 9.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) reports the findings of an assessment of the likely significant environmental effects on geology and soils as a result of the Project.
- 9.1.2 The geology and soils topic comprises several sub-topics, namely: geology as resource (e.g. for minerals); soils as a resource; and also the potential for effects associated with land contamination that may arise through the disturbance of contaminants contained in the subsurface. Additionally, the consideration of seismicity and other natural ground hazards has also been included.
- 9.1.3 The site is currently an operational airport with only very limited soil resources present. The remainder of the site comprises hardstanding or buildings at surface. Soils when viewed as a resource are therefore scoped out of the assessment.
- 9.1.4 Similarly, the geology underlying the airport site has no particular designation under Kazakh legislation and the Project sits entirely within the existing airport boundary. Geology and associated minerals resources are therefore also scoped out.
- 9.1.5 Given the potential for contamination to have occurred due to the site's history as an airport including its former military airport usage, the effects associated with land contamination<sup>1</sup> have been assessed for the construction phase. Given the de-icing pad and the fuel farm activities, operational stage effects are also assessed.
- 9.1.6 Additionally, given the geological setting, the potential for seismic and other natural ground hazards has also been assessed.
- 9.1.7 An assessment of likely significant effects has been undertaken for each of the sensitive receptors identified in the study area. Where necessary, commitments to mitigation measures have been made to manage any impacts on receptors.

### 9.2 Methodology

#### Applicable guidelines and standards

- 9.2.1 The assessment has been undertaken considering relevant legislation, standards, and guidance as mentioned in **ESIA Chapter 3: Policy, legal and institutional framework**.

#### Area of Influence

- 9.2.2 The area of influence for geology and soils considers the area of the Project (i.e. where ground break will occur) and 250m beyond in the assessment of receptors. However, contamination sources up to 1km from the Project will be included in the assessment, where considered to be a significant contamination source, that could have an impact on onsite receptors (for instance through the migration of impacted groundwater).

---

<sup>1</sup> The terms land quality and land contamination have been used interchangeably in this report. Both relate to the presence of contamination in the subsurface that may exist in soils, water or gaseous phases.

## Methodological approach

- 9.2.3 This section of the chapter presents the methodology applied to the assessment of likely significant effects.
- 9.2.4 The methodology for assessing land contamination effects is two-fold. Firstly, the assessment is based upon the development of a conceptual site model (CSM) which looks at potential contamination sources, contaminant transport pathways, and the presence of sensitive receptors.
- 9.2.5 The second step is to assess the likely impacts that will occur during the construction and operational stages. This is undertaken by assessing potential changes in risks at two points; the first point comprises the beginning of construction during which the majority of ground disturbance will occur (e.g. demolition and foundation installation) and the second point considers the Project during the operational phase. The purpose of the split in this assessment is to differentiate between the temporary and permanent effects of the construction and operation of the Project.
- 9.2.6 The significance of effects of contamination will be assessed using the general methodology as outlined in Section 4.7 of **ESIA Chapter 4: ESIA scope and methodology**. It should be noted that the assessment of likely significant effects specifically excludes asbestos and radiological contamination.

## Desk based Review

- 9.2.7 A review of desk based information was completed as part of the ESIA. These are derived from available information from both national and international sources and previous reports which cover the Project area as follows:
- Country Profile – Kazakhstan<sup>2</sup>
  - Water Resources – Main river basins of Kazakhstan<sup>3</sup>
  - Almaty International Airport Scoping Review Summary Report<sup>4</sup>
  - Environmental & Social Due Diligence Assessment - Project Apple: Almaty International Airport<sup>5</sup>
  - Environmental and Social Action Plan - Project Apple: Almaty International Airport<sup>6</sup>
- 9.2.8 As part of the 'Seismicity and natural hazards' review, several scientific papers have also been researched and information compiled to outline the hazards present and the proposed mitigation methods. The sources for the review have been included in the relevant seismic review section. It should be noted that a site-specific seismic hazard report has not been produced or obtained at this stage.

## Limitations and assumptions

- 9.2.9 This section outlines all assumptions that have been made in this chapter as well as limitations of this study.
- 9.2.10 The available data on ground conditions (inclusive of soil and groundwater quality) are limited at the time of writing this chapter. This is due to the limited spatial coverage of existing ground

---

<sup>2</sup> Food and agriculture Organisation of the United Nations, 2012

<sup>3</sup> UN Development Programme Kazakhstan

<sup>4</sup> Almaty International Airport Scoping Review Summary Report, Mott MacDonald, 2025

<sup>5</sup> Environmental & Social Due Diligence Assessment - Project Apple: Almaty International Airport. Waterman, 2020a

<sup>6</sup> Environmental and Social Action Plan - Project Apple: Almaty International Airport. Waterman, 2020b

investigations when compared to the Project. Furthermore, the range of analyses completed thus far do not currently cover all known potential onsite contamination sources. Similarly, there is no ground gas data available for the site at the time of writing this chapter.

- 9.2.11 Data gaps present are to be addressed during the preconstruction and construction phase through continuation of the existing groundwater monitoring and further ground investigation to cover the Project and improve understanding of soil and groundwater conditions present at the site. This forms part of the embedded mitigation as identified in Section 9.6.
- 9.2.12 Any risks associated with asbestos, toxic mould, or radiological contaminants are not assessed. Specialist advice should be sought from a suitably qualified contractor(s) with respect to risks from asbestos, where identified.

## 9.3 Baseline

### Current baseline

#### Site description relevant to geology and soils

- 9.3.1 Almaty International Airport (ALA) is located on the north-eastern outskirts of Almaty. The area to the south of the airport is predominantly residential; the area to the west is mixed commercial and residential; and the area to the north and east are predominantly agricultural.
- 9.3.2 The Project comprises the following components:
- **Full depth reconstruction of main runway:** This area comprises the existing main runway of ALA (05L-23R), which is currently used as a taxiway due to deterioration. Soft landscaped areas are currently present in addition to hardstanding of the runway itself. In the surrounding area to the south are residential properties.
  - **New taxiway:** The area of the new taxiway is currently a soft landscaped area. Approximately to the centre of the newly proposed taxiway is a fire station. Within the footprint are also roadways connecting into the main runway.
  - **Fuel farm storage expansion and improvements to existing fuel farm:** An existing fuel farm is situated here with 13 tanks present and in use for storage of aviation fuel. The land comprises areas of hardstanding.
  - **Full depth reconstruction of existing VIP apron:** The land comprises the existing VIP apron. To the east and south are areas of soft landscaping. Further west offsite are residential areas.
  - **Aerodrome and ground handling village:** This component comprises predominantly hardstanding and a number of buildings. The perimeter comprises areas of soft landscaping. To the north-east is the existing fuel farm.
  - **Domestic terminal renovation:** This component is located directly north of the VIP apron and directly west of one of the parking rehabilitation areas. The site comprises the existing domestic terminal building.
  - **New de-icing pad:** A de-icing pad is proposed to the east of the domestic terminal. It currently comprises predominantly soft landscaping in the south and to the west it comprises hardstanding.
  - **New landside and airside warehouses:** This component is situated to north of the rehabilitation parking area and west of the aerodrome and ground handling village. It comprises an existing area of hardstanding with warehouses present.
  - **Rehabilitation of parking stands:** This comprises four land parcels of existing parking stands, that are proposed to be rehabilitated. All areas comprise hardstanding.

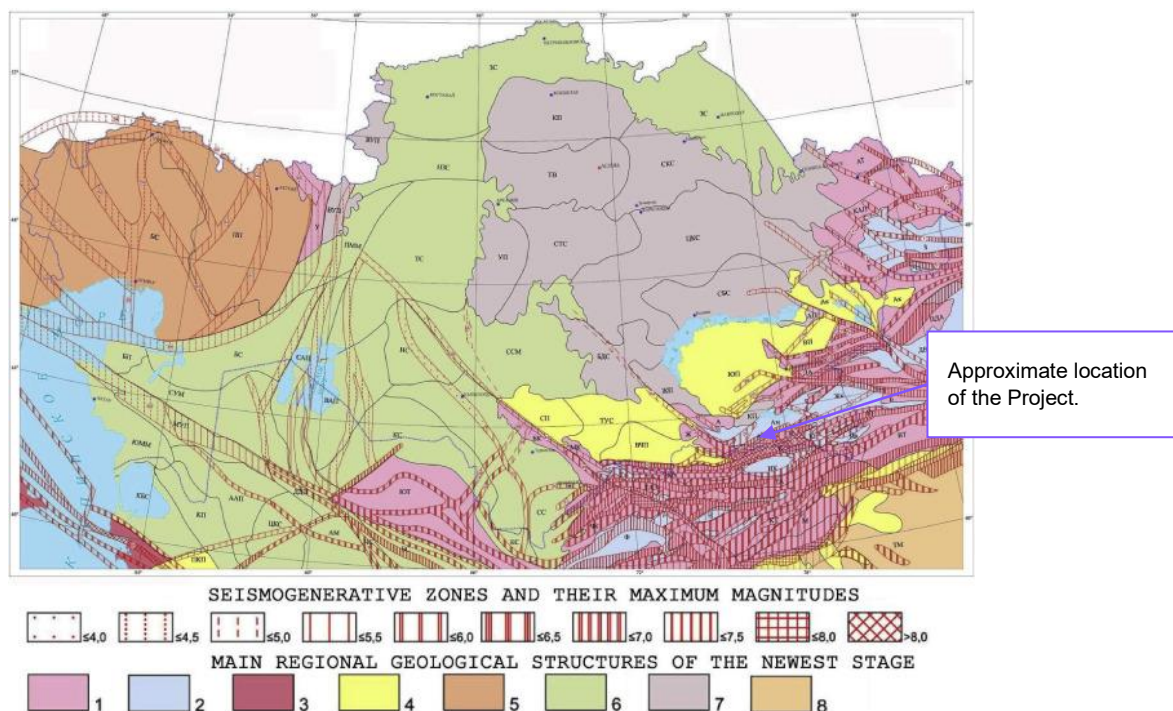
- **New head office and training centre:** The component is situated to the west of the airport and is just east of existing commercial properties. The land comprises hardstanding.
- **New in-flight catering facility:** This component currently houses unspecified buildings with a vertical storage tank. The site appears to be mainly hardstanding with a treeline forming the site perimeter.

## Seismicity and natural hazards

### Regional and local seismic context and faulting

- 9.3.3 The Project lies at the foot of Zailisky Alatau (or Ile Alatau), the northernmost mountain range of the Tian Shan, an east-west orientated mountain belt formed via the collision of the Eurasian and Indian continental tectonic plates in the Cenozoic. This region is known for its seismic activity and history of powerful earthquakes, and accounts for approximately 12mm per year<sup>1</sup> of the north-south orientated crustal shortening (Zubovich et al, 2010)<sup>7</sup>.
- 9.3.4 From Figure 9.1 and Figure 9.2, it is clear that the most active and potential for the highest magnitude earthquakes are the south-eastern areas of Kazakhstan, including Almaty and the Project.

**Figure 9.1: Map of seismogenerative zones of Kazakhstan**

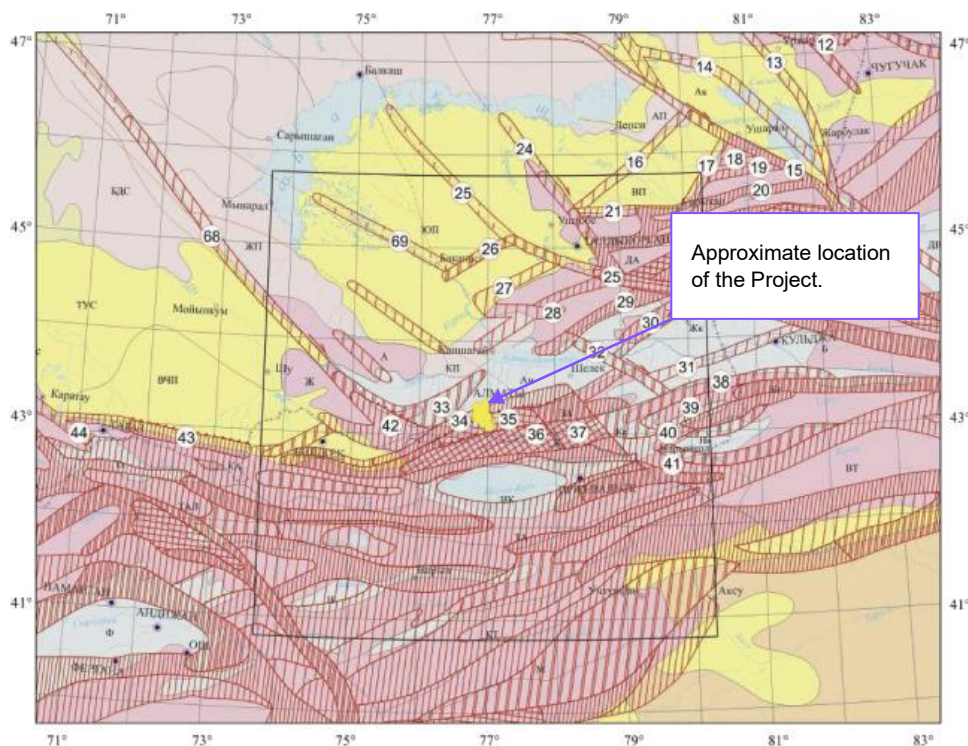


Source: Silacheva et al (2017)<sup>8</sup>

<sup>7</sup> Zubovich, A. & Wang, Xiao-qiang & Scherba, Yuri & Schelochkov, Gennady & Reilinger, Robert & Reigber, Christoph & Mosienko, Olga & Molnar, Peter & Michajljow, Wasili & Makarov, Vladimir & Li, Jie & Kuzikov, Sergey. (2010). GPS velocity field for the Tien Shan and surrounding regions.

<sup>8</sup> Silacheva, Natalya & Kulbayeva, U.K. & Kravchenko, N.A. (2017). Probabilistic seismic hazard assessment of Kazakhstan and Almaty city in peak ground accelerations.

**Figure 9.2: Clipping of map of seismogenerative zones around Almaty**



Source: Silacheva et al (2017)<sup>8</sup>

### 9.3.5

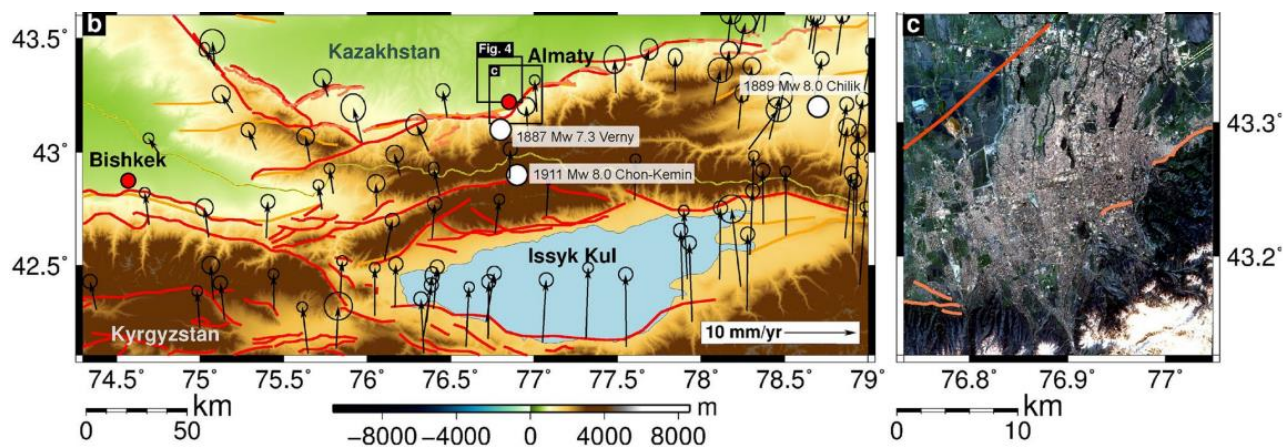
Figure 9.3 identifies several major faults associated with the Tien Shan mountain belt to the immediate south of Almaty and the Project. The movements are generally categorised as reverse mechanisms, however, there have been some strike-slip movements too. Grützner et al (2017)<sup>9</sup> outlines the evidence for active faulting along the Zailisky northern flank and found fault scarps of 2 to >20m height along the Zailisky range front East of Almaty, suggesting the faults have been active and ruptured to the surface since the Last Glacial Maximum. Grützner et al (2017)<sup>9</sup> further speculate that the reasons for the lack of published evidence of faulting and seismic activity during the Holocene include:

- The Zailisky range front has been seismically inactive during or before the Holocene with deformation undergoing elsewhere.
- The Zailisky range front is seismically active, however there are large periods of inactivity between events and therefore any morphological evidence of activity has been eroded or deposited over.

<sup>9</sup> Grützner, Christoph & Walker, Richard & Abdrakhmatov, K. & Mukambayev, Aidyn & Elliott, Austin & Elliott, John. (2017). Active Tectonics Around Almaty and along the Zailisky Alatau Range front.



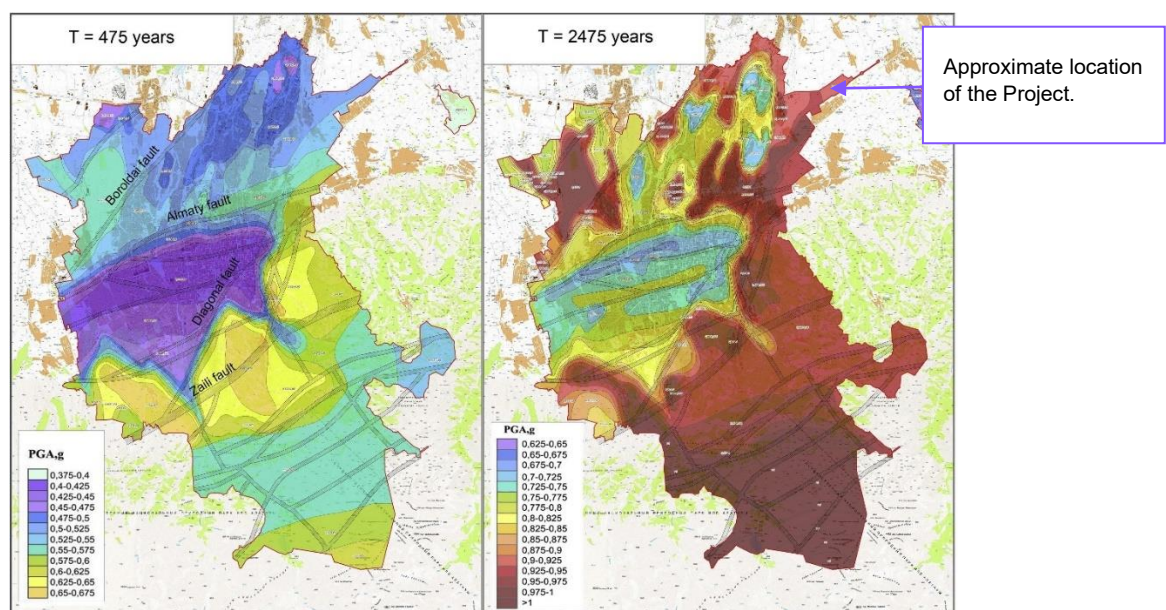
**Figure 9.3: Tectonic setting of Almaty – showing faulting at a regional scale and at a local scale.**



Source: Amey et al (2019)<sup>10</sup> Figure B – Tectonic setting of Almaty in the northern Tien Shan – Active faults from Mohadjer et al. (2016) shown in red and Grützner et al. (2017) in light orange (Amey et al, 2021)  
Figure C – Faults identified within the city of Almaty – RGB Landsat image (2017) of the city of Almaty, active faults in light orange from Grützner et al. (2017)<sup>9</sup> and fault to the north of Almaty (mapped by Amey et al 2019) shown in dark orange.

9.3.6 The most active fault zone is the Zailisky Alatau Fault a right lateral strike-slip fault, which is associated historically with significant tectonic deformation and high seismic activity. Earthquake depths are typically between 15km to 30km depth (Grützner et al, 2017)<sup>9</sup>. There is a risk of minor faults splaying/branching off the major recorded faults which have since been ‘buried’ via the expansion of the city, uncategorised or unrecorded.

**Figure 9.4: Seismic microzonation map given in terms of Peak Ground Acceleration (PGA) (g) and accounting for soil categories by seismic properties, and geotechnical zoning**



<sup>10</sup> Amey, Ruth & Elliott, John & Hussain, Ekbal & Walker, Richard & Pagani, Marco & Silva, Vitor & Abdrakhmatov, K. & Watson, C. Scott. (2021). Significant Seismic Risk Potential From Buried Faults Beneath Almaty City, Kazakhstan, Revealed From High - Resolution Satellite DEMs. Earth and Space Science.

Source: Silacheva et al (2019) <sup>11</sup> The grey 'stripes' indicate main tectonic faults.

- 9.3.7 Figure 9.4 illustrates the recorded fault regime within Almaty, which identifies that the 'Almaty Fault' is the closest fault in proximity to the Project. Note however that the source of information for the placement/mapping of the faults in the city has not been provided, and in the absence of access to geological mapping, it is difficult to corroborate or validate the placement of these features.
- 9.3.8 Due to the expansion of Almaty city, there is a risk of the presence of 'buried' faults, the surface traces of which have been hidden by the development of the city. This makes it difficult to characterise the hazards present and subsequently affects the emergency planning procedures and any design elements on major infrastructure such as further development of the airport. This risk of 'burying' morphological features is applicable to the Project and its associated expansion works.
- 9.3.9 Amey et al (2019)<sup>12</sup> have utilised Digital Elevation Models (DEMs) to identify the presence of any topographic scarps of recent ruptures within the city. They further model a series of hypothetical scenarios (utilising the OpenQuake Engine) to assess the damage and loss to the city, based upon previous earthquakes, utilising the faults identified during the digital modelling exercise. Building upon previous studies by Grützner et al (2017)<sup>9</sup>, a fault splay beneath the city has been identified, as well as a fault propagated fold to the immediate north of the city (dipping to the south beneath the city). Based on the models produced, the most damaging scenario would be an earthquake (modelling using a  $M_w$  6.5) generated along the fault splay to the north of the city.

#### Historical earthquake data

- 9.3.10 The Project lies within the most seismically active region of Kazakhstan, and as such has been affected by some of the strongest earthquakes generated along the Tian Shan Mountain belt. Available historical records show that several large and destructive earthquakes have occurred in the area: including the following notable events:
- 1887 – Verny  $M_w$  7.3 – epicentre was only a few kilometres west of the city centre. Precise location is unknown as the earthquake event pre-dated instrumentation monitoring, and no surface ruptures were recorded (blind thrust fault). It is understood that the earthquake generated many landslides (Grützner et al, 2017)<sup>9</sup>.
  - 1889 – Chilik  $M_w$  8.0 to 8.3 – epicentre was located approximately 100km to the south-east of Almaty and generated approximately 175km of surface ruptures and up to 10m of surface slip (Abdrakhmatov et al, 2016)<sup>13</sup>.
  - 1911 – Kemin  $M_s$  – 8.2 – epicentre was located on the southern slope of the Zailisky Alatau and included up to approximately 200km of surface ruptures and more than 10m slip.

<sup>11</sup> Silacheva, Natalya & Kulbayeva, U.K. & Kravchenko, N.A. (2019). On the realization of seismic microzonation of Almaty (Kazakhstan) in ground accelerations based on the "continual" approach.

<sup>12</sup> Amey, Ruth & Elliott, John & Hussain, Ekbal & Walker, Richard & Pagani, Marco & Silva, Vitor & Abdrakhmatov, K. & Watson, C. Scott. (2021). Significant Seismic Risk Potential From Buried Faults Beneath Almaty City, Kazakhstan, Revealed From High - Resolution Satellite DEMs. Earth and Space Science.

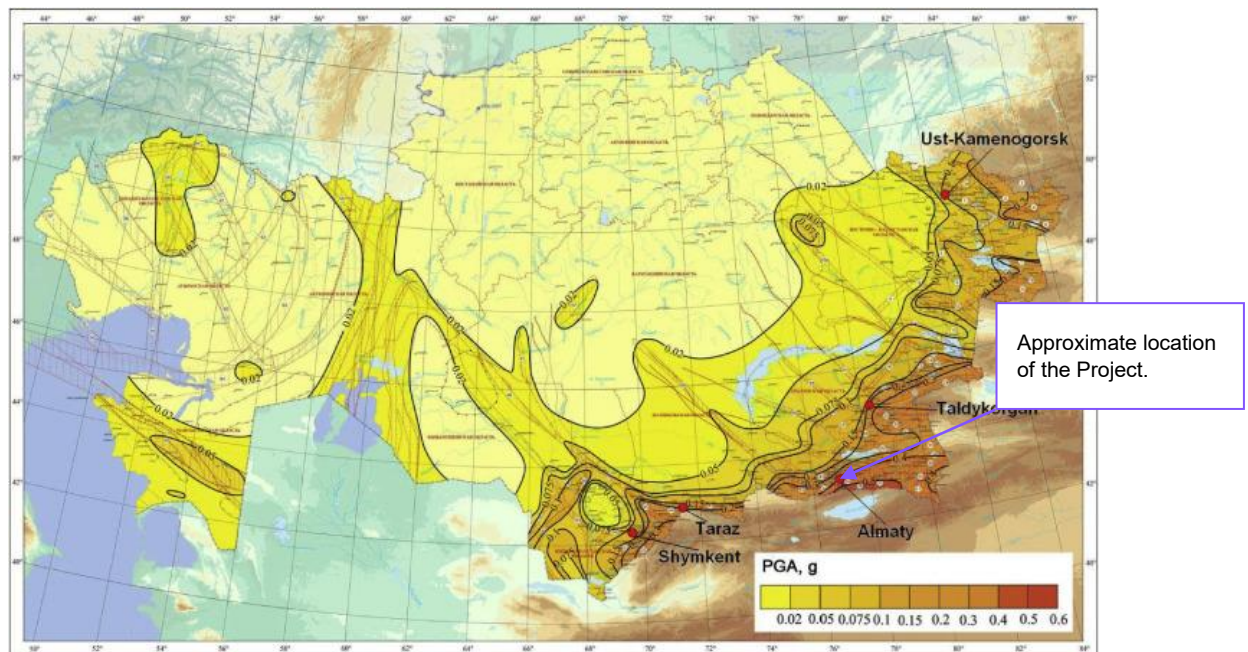
<sup>13</sup> Abdrakhmatov, K. & Walker, Richard & Campbell, Grace & Carr, Andrew & Elliott, A. & Hillemann, C. & Hollingsworth, James & Landgraf, A. & Mackenzie, David & Mukambayev, Aidyn & Rizza, Magali & Sloan, R.A.. (2016). Multi-segment rupture in the July 11th 1889 Chilik earthquake ( $M_w$  8.0-8.3), Kazakh Tien Shan, interpreted from remote-sensing, field survey, and palaeoseismic trenching: The  $M_w$  8.0-8.3 Chilik earthquake.

### Seismic microzoning of Almaty

- 9.3.11 Kazakhstan's original building code for seismic design adhered to a deterministic approach/methodology only (Deterministic Seismic Hazard Assessment – DHSAs). However, the procedure of Probabilistic Hazard Assessment (PSHA) has since been adopted to demonstrate compliance with Eurocode 8 requirements and has culminated in the generation of a series of 'probabilistic maps' which have been introduced into the Building Regulations 'Construction in Seismic Zones of the Republic of Kazakhstan' (Silacheva et al, 2019)<sup>11</sup>.
- 9.3.12 Using this procedure as a basis, several probabilistic maps have been generated for General Seismic Zoning (GSZ) and Seismic Microzoning (SMZ). The main difference between the deterministic and probabilistic procedures is that the PSHAs are aligned with the seismic design principles outlined in Eurocode 8 standards and also express these in terms of seismic intensity as well as quantitative engineering parameters (Peak Ground Acceleration [PGA]).
- 9.3.13 PGA is defined as the maximum ground acceleration recorded during an earthquake at a specific location and is typically measured in units of 'g' (gravitational acceleration).
- 9.3.14 The Design Basis Earthquake (DBE) corresponds to a seismic event with a 10% probability of exceedance in 50 years, equivalent to a 475-year return period. This level of ground motion is typically used for the design of ordinary structures and aligns with the "significant damage" limit state. Alternatively, the Maximum Considered Earthquake (MCE), represents a more extreme scenario with a 2% probability of exceedance in 50 years, or a 2475-year return period. This is associated with the "near collapse" limit state and is used to evaluate the performance of critical infrastructure under rare but severe seismic loading. These return periods are consistent with international seismic design standards, including Eurocode 8, and form the basis for defining seismic actions in both probabilistic hazard assessments and performance-based engineering.
- 9.3.15 Probabilistic maps of GSZ and SMZ of Almaty city have been generated by Silacheva et al and are presented in Figure 9.4 to Figure 9.8.
- 9.3.16 The GSZ maps produced comprise a set of five maps, including:
- Map of PGA for practical use (Figure 9.7 and Figure 9.8);
  - Probabilistic Maps of SMZ in terms of macroseismic intensity for two probabilities of exceedance (10% and 2 % in 50 years) (Figure 9.5 and Figure 9.6);
  - Map of soil categories by seismic properties (factored in to Figure 9.4) and;
  - Map of geotechnical zoning (factored in to Figure 9.4)
- 9.3.17 An additional set of maps have been produced including a map of  $V_{s30}$  for Almaty (shear wave velocity in the top 30m), a map of average intensity increments, as well as seismic hazard maps for varying site conditions.

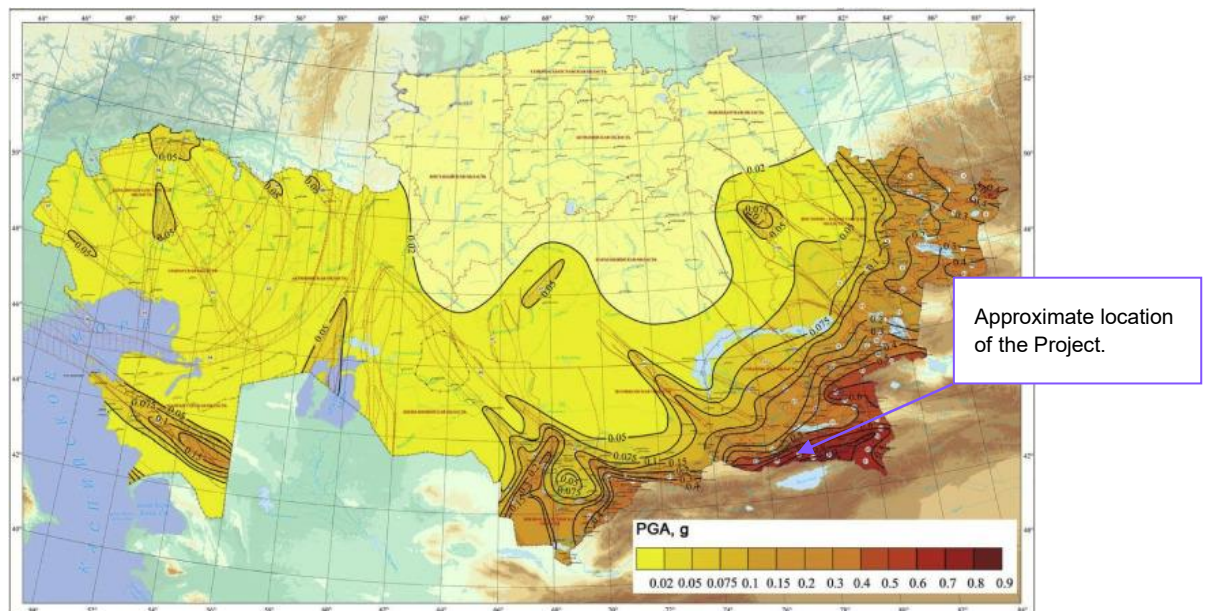


**Figure 9.5: General seismic zoning map of the territory of Kazakhstan in PGA for probability of exceeding 10% during 50 years (return period 475 years)**



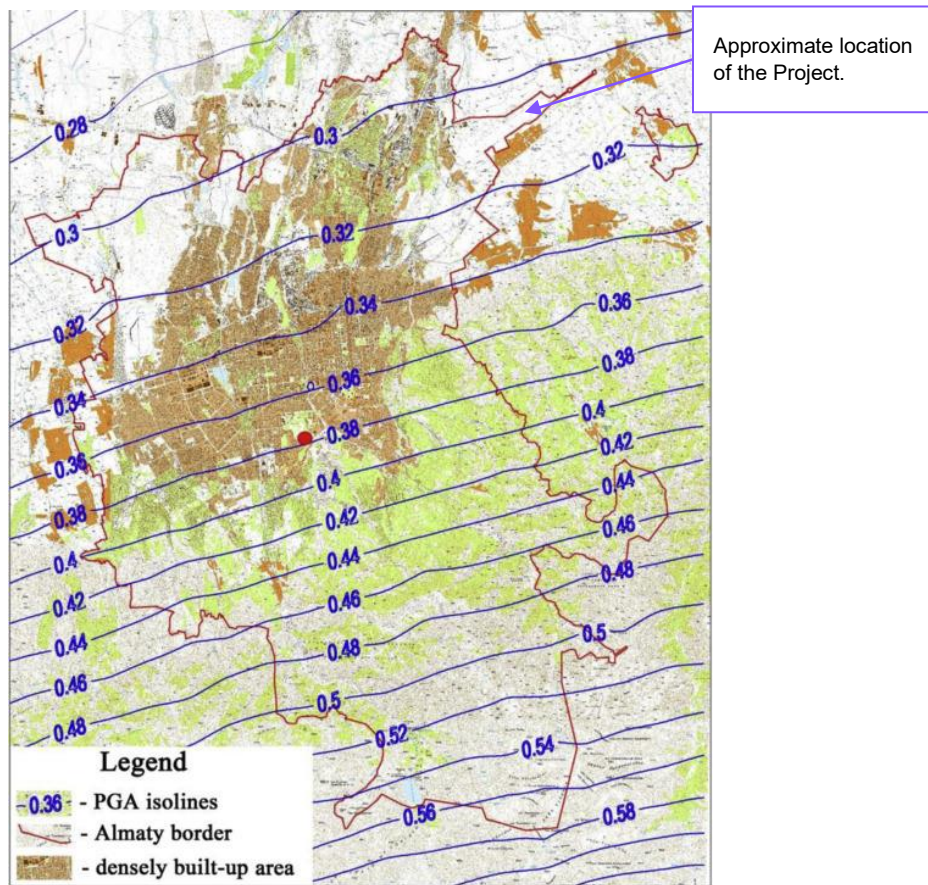
Source: Silacheva et al (2017)<sup>8</sup>

**Figure 9.6: General seismic zoning map of the territory of Kazakhstan in PGA for probability of exceeding 2% during 50 years (return period 2475 years)**



Source: Silacheva et al (2017)<sup>8</sup>

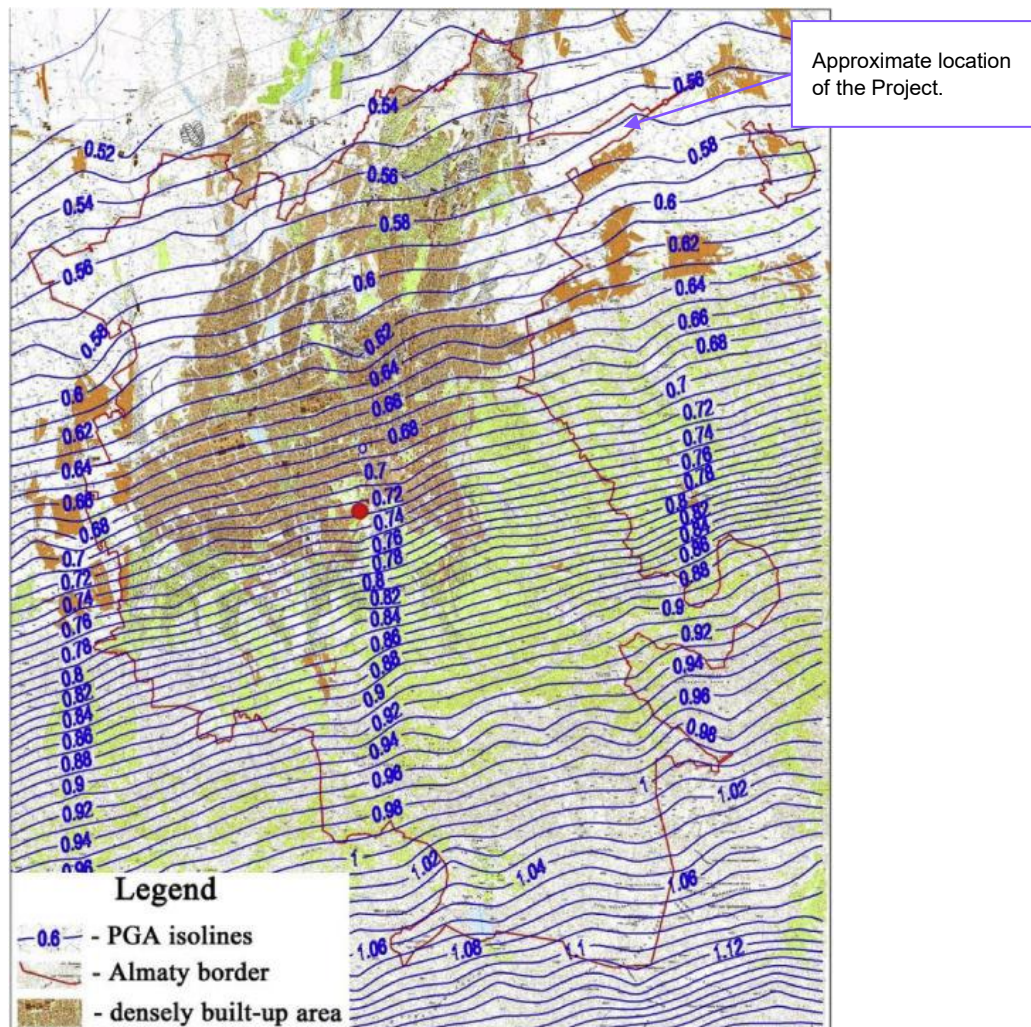
**Figure 9.7: The Seismic Hazard Maps of the territory of Almaty city for probability of exceedance 10% in 50 years in PGA (recurrence period of 475 years)**



Source: Silacheva et al (2017)<sup>8</sup>



**Figure 9.8: The Seismic Hazard Maps of the territory of Almaty city for probability of exceedance 2% in 50 years in PGA (recurrence period of 2475 years)**



Source: Silacheva et al (2017)<sup>8</sup>

- 9.3.18 It is clear from the published studies that the maximum PGA values are concentrated within the area to the south-east of Kazakhstan, corresponding to the most seismically active regions, the 'Kemin' and the 'North-Kungey' seismogenic zones.
- 9.3.19 Table 9.1 lists the published PGA (g) values for either Almaty (on larger scale seismic hazard maps – GSZ) or, where possible, the Project (local seismic hazard maps – SMZ and OpenQuake).

**Table 9.1: Summary of PGA values in g recorded across different sources of literature or databases**

|                                                                        | Source of Information                                    |                                                                                  |                                                                                                                                                              |                                                                                                                                                     |
|------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PGA (g) Exceedance Criteria</b>                                     | <b>OpenQuake Map (2023 – accessed 2025)<sup>14</sup></b> | <b>Silacheva et al (2017)<sup>8</sup></b>                                        | <b>Silacheva et al (2017)<sup>8</sup></b>                                                                                                                    | <b>Silacheva et al (2019)<sup>11</sup></b>                                                                                                          |
|                                                                        |                                                          | <b>GSZ for Kazakhstan, accounting for rock and soil behaving similar to rock</b> | <b>SMZ accounting for the mean values of the geometric mean PGA for rock and soils behaving similar to rock grounds was carried out within the territory</b> | <b>Utilises the SMZ for Almaty, corrected by accounting for the Map of Soil Categories by Seismic Properties and the Map of Geotechnical Zoning</b> |
|                                                                        | <b>Figure in Report</b>                                  |                                                                                  |                                                                                                                                                              |                                                                                                                                                     |
|                                                                        | N/A                                                      | Figure 9.5 & Figure 9.6                                                          | Figure 9.7 & Figure 9.8                                                                                                                                      | Figure 9.4                                                                                                                                          |
| <b>PGA (g) exceeding 10% during 50 years (return period 475 years)</b> | 0.35                                                     | 0.4                                                                              | 0.31                                                                                                                                                         | 0.5 to 0.55                                                                                                                                         |
| <b>PGA (g) exceeding 2% during 50 years (return period 2475 years)</b> | Not readily available through OpenQuake                  | 0.7                                                                              | 0.57                                                                                                                                                         | 0.9 to 0.95                                                                                                                                         |

9.3.20 In summary the available studies quantifying the seismic microzoning of Almaty indicate a significant spatial variability in ground shaking potential across Almaty, driven by several factors including the heterogeneous subsurface conditions, and proximity to faults. The variation in values of PGA are due to the source information being incorporated into the study. The most recent study (Silacheva et al, 2019)<sup>11</sup> utilises the seismic properties of the soil (affecting the shear velocity), and the geotechnical zoning research – which has produced the higher PGA values, however these may not be the most conservative estimates – Figure 9.4. The seismic microzonation maps differ from the background seismic hazard maps, which assume a uniform  $V_{s30} = 800$  m/s across the city. In addition from all the studies it is clear that the airport lies in an area of high seismic activity and the seismic hazard can be considered as high.

9.3.21 It is also worth noting that since the original seismic microzoning of Almaty was undertaken, the city limits are estimated to have doubled in size (Silacheva et al, 2017)<sup>8</sup> and thus the exposure and consequence of seismic events will have been altered.

#### **Susceptibility to liquefaction and landslides**

9.3.22 The Project site is built on an alluvial fan, within a deep sedimentary basin which is indicated to comprise saturated heterogeneous loose soft deposits, including pebbles, sandy loam, and loam. The nature of the subsoils beneath the Project will have an impact of the shear wave

<sup>14</sup> V. Silva, A. Calderon, M. Caruso, C. Costa, J. Dabbeek, M.C. Hoyos, Z. Karimzadeh, L. Martins, N. Paul, A. Rao, M. Simionato, C. Yepes-Estrada, H. Crowley, K. Jaiswal (2023). Global Earthquake Model (GEM) Seismic Risk Map (version 2023.1)

velocity ( $V_s$ ) of the ground, and this inherent variation in composition can lead to difficulties when predicting how the ground will behave during seismic events.

- 9.3.23 As discussed in Section 9.3.39 to 9.3.46', relatively shallow groundwater is anticipated to be present beneath the Project area of influence. During earthquake events, the violent shaking can cause rapid increases in pore water pressure, which in turn causes a sudden loss in shear strength of the surrounding soils. This in turn can induce significant settlements of overlying structures, and ground deformation.
- 9.3.24 Given the anticipated loose, and saturated deposits beneath the area of influence of the Project, there is a risk of a moderate to high liquefaction potential, and as such a detailed liquefaction potential assessment should be undertaken prior to construction works.
- 9.3.25 Additionally, the city's proximity to steep mountainous terrain increases the risk of being impacted by earthquake-induced landslides, which could disrupt access routes and critical services. Given these compounded geohazards, a detailed liquefaction assessment and slope stability analysis are essential prior to construction, alongside the implementation of ground improvement and seismic-resilient design measures.

## Geology, hydrogeology and hydrology

### Geology

- 9.3.26 The site is located in the foothill plain of Zailiysky Alatau, the Northern Tien Shan geomorphological region of Central Asia <sup>15</sup>(Karatai Geoservice, 2020). The Project is expected to be underlain by a cover of made ground as part of the existing airport apron and construction materials associated with the existing buildings. Some small areas of soft landscaping are also present which include some limited amounts of topsoil.
- 9.3.27 The underlying geology is reported by Waterman (2020) in the 2022 ESIA. The report states the underlying geology to comprise Quaternary age alluvial deposits which variably comprise loams, sandy loams, quartz-feldspar sands of various sizes and pebble (gravelly) soils.

### Hydrogeology

- 9.3.28 The underling soils are likely to contain useable groundwater resources (aquifers). However, there is no specific published mapping or designations relating to the presence or type of aquifers in the area.
- 9.3.29 There are groundwater wells on site which have been used for firefighting operations in the past. Currently no abstraction from these groundwater sources takes place, and it is understood that there is no permit in place for groundwater abstraction from the site.
- 9.3.30 It is understood that abstraction of groundwater by private companies takes place within the region, however, with water sourced from a confined aquifer at a depth of approximately 220m. The location of this abstraction is unknown. This was reported in the 2022 ESIA<sup>16</sup>.

### Hydrology

- 9.3.31 For further information on hydrology and existing site drainage reference should be made to **ESIA Chapter 14: Water resources**.

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<sup>15</sup> Karatai Geoservice (2020), Geotechnical assessment of the airport.

<sup>16</sup> Mott MacDonald (2022), Almaty Airport Expansion, Environmental and Social Impact Assessment Report 100100464- 001- Rev E, dated January 2022.

## Site history

- 9.3.32 Previous reporting for the site (Waterman, 2020a<sup>17</sup>) identifies the airport had a previous military use (and it is understood that this use is ongoing) and a use for aircraft maintenance. Based on current and historical lands uses, there is potential for contamination associated with site operations and maintenance activities on and in the vicinity of the site (for instance deposition of metals, degreasers/solvents, fuel and other volatile organic compounds).
- 9.3.33 According to information provided by ALA in the preparation of this ESIA (*'Initial Incident Report'*, dated April 2024), a minor aviation fuel spill occurred at the site, during unloading operations on a railway overpass. The spillage quantity was not reported and is stated to have spilt to ground (it is unclear if this was to a soft landscaped area or to an area of hardstanding). No other incident reports or records were provided at the time of writing this report.
- 9.3.34 A fire system audit was undertaken in 2024<sup>18</sup> which outlines the use of fire fighting foams (FFF) at the fuel depot. FFF can contain per and polyfluoroalkyl substances (PFAS) which are a group of contaminants with increased regulatory scrutiny worldwide due to their persistent and toxic nature.
- 9.3.35 The report identifies that the total foam concentrate storage capacity is 30m<sup>3</sup> and that foam concentrate is currently stored in a single 5m<sup>3</sup> horizontal bladder tank. The report identifies that the depot makes use of a foam concentrate that does not contain fluorinated surfactants.
- 9.3.36 According to information provided by ALA during the preparation of this ESIA, an audit report from June 2025, documents the available FFF concentrate stored at the airport. It documents foam concentrate (kg) stored at three rescue stations on site, within reserve trucks and at a warehouse. The total amount of foam concentrate stored onsite amounts to 13,600kg. No formal records have been provided to identify the exact locations of the storage areas (except for the fuel farm covered previously) or of incident reports following use of FFF onsite. However, limited information from ALA stated there was an accident '*at take-off from RWY05R approx. 800m after THR23L and 110m to the right side*'. Whilst the exact location is not known (however presumably on the existing runway), this may have been a likely location for use of FFF derived from the foam concentrate. Whilst the composition of the concentrate is unknown, it is likely that the FFF to have comprised of PFAS historically. The use of FFF containing PFAS is considered a potential contamination source.
- 9.3.37 There are existing hazardous waste storage facilities on site. A report provides pictures of these locations and identifies the following types of hazardous waste storage:
- Used oil barrels stored partially on hardstanding and partially of soft landscaped areas.
  - Used batteries stored on hardstanding.
  - Used filters and contaminated soil near the maintenance area (exact location unknown), which is stored within an outbuilding. Immediately in front of the outbuilding is soft landscaping. Another area is also identified to store the same materials, however is located on a hardstanding area.
  - An underground storage tank (UST) is shown and is identified to be used for hydrocarbon waste storage in the gasoline station. The UST appears to be surrounded by concrete, with areas adjacent identified as soft landscaping.
  - An oil trap is identified for emergency spills in the aviation fuel farm. The surrounding area is soft landscaped.

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<sup>17</sup> Waterman, (2020), Environmental and Social Due Diligence Assessment, Almaty Airport.

<sup>18</sup> Almaty international Airport, Fire System Audit, October 2024, Revision C.

- Areas for waste painting works (solidified paint) stored within a metal enclosure and an area used for storage of used lamps within a hardstanding area are also shown.

9.3.38 As of the time of reporting, no contamination mapping data has been made available by ALA to identify historical land uses or potential sources of contamination at the site.

9.3.39 No historical maps are available for the site.

### Environmental designation/permits

9.3.40 No information surrounding any environmental permits relevant to soil quality or geological designations are noted to be relevant. It is, however, noted clause 6 and clause 8 of article 186 of the Environment Code of the Republic of Kazakhstan, impact monitoring is obligatory after emergency emissions into the environment.

### Site ground investigation

9.3.41 Table 9.2 provides a summary of the available ground investigation that has been made available for this chapter. It is noted that there is currently limited soil geo-environmental testing available, which covers the fuel farm area and one location adjacent to the new taxiway. No groundwater analysis is currently available.

#### Karatai Geoservices ground investigation, 2020

9.3.42 A ground investigation was undertaken by Karatai Geoservices at ALA for the purpose of gaining geotechnical information at the location of the VIP terminal and Mechanical engineering buildings in February 2020.

9.3.43 The investigation comprised 43 boreholes to between 10m and 5m below ground level (bgl).

**Table 9.2: Summary of encountered geology**

| Strata number | Description                                                                                   | Thickness (m)    |
|---------------|-----------------------------------------------------------------------------------------------|------------------|
| 1             | Made Ground – Surfacing of asphalt, gravel, pebbles, clay and stone                           | 0.50 to 0.70     |
| 2             | Bulk soil – stiff and firm to stiff yellow grey organic clay                                  | 0.30 to 2.60     |
| 2a            | Bulk soil – sandy cobbles with boulders                                                       | 1.30 to 2.30     |
| 3             | Stiff and firm to stiff yellow grey organic clay                                              | 0.80 to 2.90     |
| 4             | Soft to firm yellow grey with layers of coarse sand and inclusion of carbonates. Ferruginous. | 8.70 to 10.70    |
| 5             | Firm to stiff yellow grey organic clay with inclusions of carbonates and coarse sand layers.  | 0.90 to 1.90     |
| 6             | Coarse sand with inclusions of gravel and pebbles up to 20%                                   | >1.70 (unproven) |

9.3.44 Groundwater was struck in each borehole at depths ranging between 3.3 and 5.8m. Standing water levels in the boreholes during the fieldwork period was generally within 0.5m of the recorded strike.

9.3.45 The ground water level at the site was recorded at 2.8-4.1 meters below ground level. No inference of groundwater flow direction can be made from the ground investigation data.

9.3.46 No permanent water level monitoring points were installed as part of the investigation.

9.3.47 No soil or groundwater contamination analyses were undertaken, although soils and water were tested for the presence of sulphate and chloride, as these substances may pose a potential risk to building materials through chemical attack.

9.3.48 The presence of contaminants (e.g. hydrocarbon odours or visual oils) was not noted as part of the ground investigation.

### **Soil and Groundwater Sampling and analysis – Fuel farm and New Taxiway, 2025**

- 9.3.49 Nine soil samples were collected from the existing fuel farm and adjacent to the proposed new taxiway. A laboratory report by Scientific Analytical Center LLP completed the analysis of the nine soil samples, eight of which were collected at depths ranging from 1.80m to 3.40m from the fuel farm and one sample at 10.5m adjacent to the proposed taxiway. All samples were analysed for petroleum hydrocarbons, this is likely total petroleum hydrocarbon concentration that has been reported. The lab report provides an analysis of the data by comparing the results to the Dutch Intervention Values (DIV) for soil. None of the sample concentrations were shown to exceed the DIV.
- 9.3.50 All nine locations were installed with groundwater monitoring installations and were sampled and analysed for a range of metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), PFAS (largely from FFF), and de-icing complex (Glycol).
- 9.3.51 The report provides an assessment of the results and compares the measured concentrations to the Maximum Permissible Concentrations (MPC) of the Republic of Kazakhstan and to the DIV (herein the assessment criteria), where values exist.
- 9.3.52 The results identify that VOCs within all samples to generally be below the level of detection. The only exception to this is in the case of measured concentrations of Benzene, Toluene, Ethylbenzene and Xylene (BTEX). BTEX concentrations are however shown to be below the adopted assessment criteria.
- 9.3.53 PCB concentrations were detectable within four of the nine monitoring locations. Concentrations were detectable at boreholes one to three and nine which are located at the fuel farm. Due to the types of PCBs analysed for, no assessment criteria are available for comparison.
- 9.3.54 PFAS and “Fire Foam” content in water were also analysed in groundwater samples. The PFAS test completed is stated to be Fluorobenzene. PFAS compounds are defined by multiple carbon and fluorine bonds. The carbon and fluorine bonds make PFAS chemically stable and persistent within the environment. In the case of Fluorobenzene its structure comprises a benzene ring with one fluorine. This compound is classed as an aromatic compound and lacks a fluorinated alkyl chain and the multiple carbon fluorine bonds, which are characteristic of PFAS. The measured concentration for Fluorobenzene is shown to be below the level of detection. The analysis completed should not be considered as a PFAS test. The analysis of “Fire Foam” presumably in groundwater samples is not defined. The report however states the test is for the “determination of surfactant content in natural and wastewater”. This test is unlikely to comprise any PFAS analysis due to the method of analysis (photometry), which would not provide the sensitivity required to reliably complete analysis for PFAS. The results are not provided within the laboratory report.
- 9.3.55 The results for testing of glycols were completed for two types of analyses of glycol defined as Type I and Type IV. Detectable concentrations of Type I glycol were noted to be present within all monitoring locations. Type IV glycol was detectable at all locations, except borehole six and nine. No assessment criteria are available for glycols. The report states that currently there are no formalised methods for recovery or control of de-icing agents (glycols) when used on the airfield. As a result, surface water runoff and infiltration to ground occurs.
- 9.3.56 The results for Total Petroleum Hydrocarbon (TPH) analysis within groundwater samples were absent from the laboratory report. However, the assessment within the report states TPH concentrations exceeded the DIV in two borehole locations (boreholes two and three) within the fuel farm location.



- 9.3.57 Concentrations of inorganics and metals were shown to be generally low or below detection. Elevated selenium concentrations were however reported, but were considered to be associated with natural background concentrations, due to the absence of any credible onsite source. No concentrations were reported above the assessment criteria.
- 9.3.58 The report concludes that further analysis is to be completed as part of the ongoing monitoring works across the site. Continuation of the monitoring is stated to inform any requirements for remediation based on the contamination status.

### Contamination conceptual site model

- 9.3.59 A contamination CSM has been developed using a source-pathway-receptor approach that is common in land contamination assessment. This uses existing baseline data summarised previously and uses a precautionary approach considering that contamination will be present beneath the site.

The following terms along with their definitions are given below:

- Source - a contaminant or pollutant that is in, on or under the land and that has the potential to cause harm or pollution.
- Pathway - a route by which a receptor is or could be affected by a contaminant.
- Receptor - something that could be adversely affected by a contaminant, for example a person, waters, an organism, an ecosystem, or other receptors such as buildings, crops or animals.

### Summary of contamination sources

- 9.3.60 Contamination sources either within the development boundary (on-site) or those present in the in the surrounding area (up to 1km from the development site) have been identified and are listed in Table 9.3.

**Table 9.3: Summary of potential contamination sources**

| Sources                                                                    | Potential contaminants of concern                                                                                    | Distance to footprint of Project                                                           |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Spills of fuel during aircraft refuelling or other vehicle movements/usage | Petroleum Hydrocarbons                                                                                               | Within footprint                                                                           |
| Spills and leakage from tanks on fuel farm                                 | Petroleum Hydrocarbons                                                                                               | Within footprint                                                                           |
| De-icing operations                                                        | Urea, ethylene, propylene glycol based fluids, sodium acetate, potassium acetate, sodium formate, potassium formate. | Within footprint                                                                           |
| Vegetation spraying                                                        | Herbicides and pesticides                                                                                            | Within footprint                                                                           |
| Use of FFF and fire station                                                | PFAS                                                                                                                 | A number of storage areas located on site.                                                 |
| Electrical substations, transformers and oil filled cables                 | PCBs (Polychlorinated Biphenyls)                                                                                     | PCB containing transformers (Numbers 6, 72, 25, 10, 22, 26, 30, 31) in multiple locations. |
| Hazardous waste storage areas                                              | Metals, petroleum hydrocarbons, fuels, oils, asbestos, degreasers such as chlorinated solvents                       | Within footprint                                                                           |
| Light industrial land uses                                                 | Metals, petroleum hydrocarbons, fuels, oils, degreasers such as chlorinated solvents                                 | Within footprint                                                                           |

| Sources                                 | Potential contaminants of concern                                                              | Distance to footprint of Project                      |
|-----------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Underground storage tanks for fuel oils | Petroleum hydrocarbons                                                                         | Within footprint                                      |
| Unspecified industrial building         | Metals, asbestos, petroleum hydrocarbons, fuels, oils, degreasers such as chlorinated solvents | Within footprint – at new in-flight catering facility |

## Pathways

9.3.61 The following contamination pathways have been considered and are summarised in Table 9.4.

**Table 9.4: Summary of contamination pathways**

| Pathways                                                                              |
|---------------------------------------------------------------------------------------|
| Human uptake through dermal contact, ingestion, inhalation of soils, dust and vapours |
| Windblown dust migrating to off-site receptors                                        |
| Leaching of soils contamination into underlying aquifers                              |
| Migration of contaminants in groundwater                                              |
| Migration of ground gases or vapours into buildings                                   |
| Direct contact with contamination in soils or groundwater                             |

## Receptors

9.3.62 The existing geology and soil receptors that have been identified from the data review are shown in Table 9.5.

**Table 9.5: Summary of receptors**

| Receptor                    | Type                                         | Sensitivity |
|-----------------------------|----------------------------------------------|-------------|
| People Receptors            | Airport site users – passengers              | Medium      |
|                             | Airport site users – workers                 | Medium      |
|                             | Airport site users – residents               | High        |
| Environmental Receptors     | Groundwater in the underlying alluvial soils | Medium      |
|                             | Surface water                                | Medium      |
| Built Environment Receptors | Existing or proposed airport infrastructure  | Low         |

## Future baseline

9.3.63 It is considered that there would not be a change to the existing baseline conditions should the project not go ahead.

## 9.4 Potential impacts

9.4.1 The proposed construction works are identified in **ESIA Chapter 2. Project description** and may be the source of potential impacts at the Project.

## Seismic and natural hazards

9.4.2 The potential seismic hazards and their risks affecting the Project can be divided into the following broad categories, including:

- Ground shaking – potential to cause significant structural damage or building collapse at the airport and related infrastructure
- Liquefaction potential – substantial ground settlement, tilting or collapse of structures and catastrophic failure of foundations.
- Fault movement/Blind Faults – surface rupture may have adverse implications in particular for linear infrastructure such as runways or underground utilities. Blind faults pose a risk as they are difficult to map and monitor as they are not exposed at the surface.
- Landslides – despite the Project being situated on relatively flat land, the Project's proximity to the Zailisky Alatau mountains to the south may result in earthquake-induced landslides extending to impact the Project.
- Secondary hazards, including fires or hazardous material spillage.
- Operational disruption in the event of an earthquake.

## Land contamination

9.4.3 Table 9.6 outlines the potential impacts in respect of land contamination that may be caused by the construction and operation of the Project without appropriate mitigation in place. Temporary impacts are construction related, and permanent impacts are the permanent effects of construction and/or operation of the Project.

**Table 9.6: Potential impacts in relation to land contamination from the Project**

| Activity                                                                                                                           | Impact                                                                                                      | Receptors                                             | Temporary / permanent |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------------------|
| Excavation and movement (including off-site disposal) of potentially contaminated soils during construction.                       | Mobilisation or exposure of contamination through leaching, wind-blown dust, vapours or via direct contact. | People, groundwater, surface water, built environment | Temporary             |
|                                                                                                                                    | Reduction in soil contamination levels in the Project.                                                      | People, groundwater, surface water, built environment | Permanent             |
| Construction vehicle and equipment maintenance and storage of fuels/oils for construction vehicles and equipment                   | Accidental spillages and leaks resulting in ground contamination                                            | People, groundwater, surface water, built environment | Temporary             |
| Operational vehicle, aircraft and equipment maintenance and storage of fuels/oils for operational vehicles, aircraft and equipment | Accidental spillages and leaks resulting in ground and/or groundwater contamination                         | People, groundwater, surface water, built environment | Permanent             |

## 9.5 Assessment of effects

9.5.1 The following section discusses the potential effects on receptors as a result of the land quality conditions at the site during both the construction and operational stages.

9.5.2 Seismic and other natural ground hazard effects are assessed at the operational stage as they apply to the completed Project.

## Temporary (construction) effects

### Land contamination effects

- 9.5.3 The assessment considers those linkages between contamination sources, pathways and receptors that could generate significant effects and is based on available information and professional judgement. It is not necessary to quantify every pollutant linkage in detail at the present stage (a site-specific risk assessment will be undertaken which performs this function as part of the mitigation measures).
- 9.5.4 Instead the impact assessment considers the anticipated level of contamination likely during the construction period and the effects of any mitigation when applied (reported as residual effects in Section 9.7). Using professional judgment, this has been assessed using the categories of impact magnitude and receptor sensitivity given in **ESIA Chapter 4. ESIA scope and methodology**.

#### People receptors

- 9.5.5 The construction works may result in the creation of pathways for pre-existing contamination to migrate through disturbance of the ground and existing below ground structures during demolition together with the excavation, transport and stockpiling of potentially contaminated soils as well as the potential for volatile contamination in groundwater being exposed in excavations.
- 9.5.6 Adjacent sites in the vicinity of the construction work zones comprise wider operational areas of the airport, light industrial/commercial sites and residential sites. Impacts could occur via excavation and exposure of contaminated soils or groundwater which could migrate to and affect airport users that remain in operational areas or onto neighbouring sites or by vapour diffusion or wind-blown dust (affecting their occupants or users).
- 9.5.7 The works may also lead to the creation of new pathways (for example, service trenches) through which additional vapour migration into excavations, confined spaces and structures could occur, potentially resulting in the inhalation of noxious gases/vapours by construction workers or future maintenance or airport users and/or the build-up of vapours within structures.
- 9.5.8 These effects would be expected to be **adverse**, temporary and cover a relatively small spatial area (i.e. within and immediately adjacent to the site boundary). The people receptors that may be affected by contamination may be regarded as **low to high sensitivity** receptors and the magnitude of impact is considered to be **moderate**, resulting in **minor to major** adverse effects (varying as a result of the differing sensitivity of the receptors) as shown in Table 9.7.

#### Built environment receptors

- 9.5.9 The built environment relates to the proposed structures and existing structures or below ground services both in and adjacent to the footprint of the proposed works.
- 9.5.10 Temporary impacts from land quality could relate to the migration of new contaminants to existing structures (for instance the migration of hydrocarbons to potable water supply pipes) or the creation of additional vapour pathways.
- 9.5.11 These impacts would be expected to be **adverse**, temporary and cover a relatively small spatial area (within the site boundary). The existing and proposed built environment that may be affected by contamination may be regarded as **low sensitivity** receptors and the **magnitude** of impact is considered to be **moderate**, resulting in a **minor** effect which is not significant.

### **Groundwater**

- 9.5.12 For the assessment of likely significant effects in relation to groundwater refer to **ESIA Chapter 14: Water resources**.

### **Surface water**

- 9.5.13 For the assessment of likely significant effects in relation to surface water refer to **ESIA Chapter 14: Water resources**.

## **Permanent and operational effects**

### **Seismic effects**

- 9.5.14 The seismic hazards relating to the site will need a significant design effort to understand the hazards and the associated vulnerability of the assets. Most of these hazards can be mitigated by good robust design as required by design standards. As such the effects of seismic hazards is presented in the residual effects assessment.

### **Land contamination effects**

#### **People receptors**

- 9.5.15 At the end of the construction period, temporary pathways will largely have been stopped as the Project infrastructure will be in place and excavations and soil handling will have ceased. The situation with respect to people receptors will be very similar to the existing baseline conditions (i.e. pre-development) as the site is already an operational airport. In the absence of mitigation, permanent effects are therefore judged as **negligible**.

#### **Built environment receptors**

- 9.5.16 Permanent effects relate to the long-term contact of the built environment with the existing ground conditions. In the absence of mitigation, permanent effects are judged as **negligible** i.e. the existing baseline site conditions would remain broadly the same and the site is already an operational airport.

### **Groundwater**

- 9.5.17 For the assessment of likely significant effects in relation to groundwater refer to **ESIA Chapter 14: Water resources**.

### **Surface water**

For the assessment of likely significant effects in relation to surface water refer to **ESIA Chapter 14: Water resources**.

## **9.6 Mitigation**

### **Seismic hazard mitigation**

#### **Construction and operational mitigation**

- 9.6.1 Probabilistic seismic hazard estimates expressed in engineering parameters are essential tools for effective seismic microzoning, risk assessment, and the strategic planning. These inputs are already integrated into Kazakhstan's national building codes and regulatory frameworks, which govern the design and construction of infrastructure to withstand expected ground motions and associated hazards.

- 9.6.2 Kazakhstan's national seismic monitoring infrastructure, including real-time data acquisition and international integration, provides a strong foundation for ongoing risk management. It is expected that the Project will utilise the latest seismic data, microzoning inputs, and engineering standards to ensure long-term safety and resilience.
- 9.6.3 Seismic design for the Project will follow national building codes and international standards to ensure resilience to earthquake-related hazards. These standards and regulations include:
- Eurocode 8 – Design of structures for earthquake resistance
  - Building Regulations – Construction in Seismic Zones of the Republic of Kazakhstan
- 9.6.4 No additional mitigation measures are proposed under the Environmental and Social remit. It is expected that all seismic risk-related design and construction measures will be addressed through compliance with national building codes and engineering standards. Emergency preparedness and disaster management planning are also governed by national frameworks and institutional responsibilities.

## Land contamination mitigation

### Construction mitigation

- 9.6.5 Mitigation measures are to be incorporated into a Construction Environmental and Social Management Plan (C-ESMP) to ensure that potential impacts from contamination are mitigated during construction. This would likely include for soils measures to prevent dusts associated with earthworks as well as appropriate hazardous materials storage.
- 9.6.6 Monitoring reports<sup>19</sup> and the ESAP compliance report relating to ongoing works at the airport show that similar measures have been successfully employed during previous works, therefore these actions comprise extensions of the current compliant measures being used.
- 9.6.7 Embedded mitigation measures are provided in Section 2.7 of **ESIA Chapter 2: Project description** and are outlined below for geology and soils.
- 9.6.8 Existing mitigation for the Project:
- Soil and Groundwater quarterly monitoring
  - New drainage network
- 9.6.9 Planned mitigation will include:
- Spill prevention
  - Continuation of quarterly monitoring
  - Soil remediation as part of the fuel farm upgrade
  - Finalise the implementation of the recommendations and mitigation measures arising from the fuel farm assessment
  - Production of map of potential contamination associated with the airport
  - Action plan for soil and groundwater remediation
- 9.6.10 The embedded mitigation (existing and proposed) will inform the management of construction related impacts for geology and soils. Remediation of soils will be completed based on ground investigation findings. The requirements of ground investigations are further detailed below.

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<sup>19</sup> Almaty Airport Reconstruction Program (with a new passenger terminal construction (Environmental & social Review and Audi, SE Solution (Pty)

## Ground investigation and risk assessment

- 9.6.11 A ground investigation is being undertaken to assess soil and groundwater quality in areas where contamination is known or suspected. The current scope prioritises locations with identified contamination risks, such as the fuel farm, in alignment with baseline findings. While the investigation supports construction planning, monitoring will continue through the construction phase.
- 9.6.12 The investigation is focused on key contamination sources, primarily the fuel farm, which is one of the components of Project Horizon. Ground investigation activities commenced in May 2025 and have included soil and groundwater sampling and testing, as described in Section 9.3 of this chapter.
- 9.6.13 Should contamination be encountered in other Project Horizon components during construction, a targeted ground investigation will be undertaken to assess soil and groundwater quality in line with Kazakhstan regulations and lender requirements. The information from all investigations should be used to inform the need for any additional site-specific mitigation over and above that already included in the C-ESMP, and to determine the need for remediation to protect end users.
- 9.6.14 At the time of writing the current Environmental and Social Waiver Conditions specifically required the following to be undertaken:
- Conduct additional soil and groundwater investigation and share the sampling plan with the Senior Lenders by July 31, 2025.
  - Submit map of potential contamination associated with the Airport to the Senior Lenders by August 31, 2025.
  - Share the soil and groundwater monitoring report with the Senior Lenders by August 31, 2025.
  - Prepare and submit to the Senior Lenders a time-bound, costed, action plan, in a form and substance acceptable to the Senior Lenders, for soil and groundwater remediation by 30 September 2025.
  - Prepare a draft time-bound action plan (excluding budget), in a form and substance acceptable to the Senior Lenders, for upgrading and preventative maintenance programme for the fuel tank farm ensuring the facility complies with good international industry practices (GIIP) in terms of spill prevention, atmospheric emissions, fire risk management and occupational health and safety by July 30, 2025.
  - Prepare the final action plan and budget for upgrading and preventative maintenance programme for the fuel tank farm by September 30, 2025.
  - Finalise the implementation of the recommendations and mitigation measures arising from the fuel farm assessment according to dates outlined in the action plan.
- 9.6.15 These actions are considered reasonable for the continued assessment of contamination at the fuel farm site.
- 9.6.16 Where contamination is identified, depending upon risk assessment outcomes, some form of remediation could be undertaken to protect receptors (e.g. source removal, or provision of appropriate cover soils or installation of vapour barriers). Such investigations and assessment would be undertaken in accordance with Kazakhstan and prospective Lender guidelines. Where local guidelines do not exist, then internationally recognised guidelines on contamination investigations and assessment of soils and groundwater contamination should be used in agreement with the Lender's technical advisors.
- 9.6.17 Ground Investigation should target known source areas of contamination. The following elements should be included within the scope of ground investigation:

- Review of any further historical ground investigation information, pertaining to geological conditions and soil and groundwater conditions.
- Completion of a ground investigation comprising boreholes and/or trial pits at suitable grid spacing in areas of proposed ground break and known onsite sources of contamination.
- Available groundwater monitoring wells should continue to be monitored (e.g. fuel farm location).
- Post fieldwork monitoring should continue to be undertaken quarterly as already agreed.
- Soil and groundwater laboratory testing for the following contaminants as previously identified in the previous independent monitoring reports is recommended. The agreed suites are as follows:
  - Oil products (petroleum hydrocarbons)
  - Organic carbon %
  - Firefighting foam
  - Glycols in terms of anti-icer (Type I and Type IV)
  - Metals (As, Cu, Cd, Hg, Pb, Ni, Zn, Se, Cr3+, Cr6+)
  - Volatile Organic Compounds (VOCs)
  - PFAS (Per and poly fluoroalkyl substances)
  - PCB (Polychlorinated biphenyls)
  - PAH (Polycyclic aromatic hydrocarbons).
- Risk assessment report to compare soil and groundwater quality to local and internationally recognised standards (e.g. Russian standards, United States Environmental Protection Agency, Dutch or UK standards) where local standards are not available.
- Should any significant soil or groundwater contamination be recorded by the investigation then a remediation options appraisal and strategy should be completed to mitigate any identified unacceptable risks.

9.6.18 Risks associated with asbestos-containing materials (ACMs), toxic mould, and radiological contaminants have not been assessed within the scope of this ESIA. Where asbestos is suspected or identified, specialist advice must be sought from a suitably qualified contractor to assess and manage associated risks in accordance with national regulations and international best practice.

9.6.19 The findings of the assessments should be used to update the C-ESMP and other related documents relating to waste management and soils re-use.

### Operational mitigation

9.6.20 As with the protection of water resources, preventative measures such as best practice site management and effective site planning/layout will be implemented to minimise the risk of any pollution incidents finding their way to ground. For a detailed list of measures reference should be made to **ESIA Chapter 14: Water resources**.

9.6.21 The following measures will be taken to reduce ground and groundwater contamination:

- Ensuring continued used of specific zones for loading and unloading (if concerning potentially polluting substances), including refuelling and maintenance of support vehicles.
- The water quality monitoring regime for both surface water and groundwater should be continued throughout the operational life of the Project.
- In case of an emergency spillage accident, emergency pollution prevention plans will be maintained to the appropriate international standards.



- The management of de-icing fluids should be formalised through the design and construction of a dedicated de-icing pad.

## 9.7 Summary of residual effects

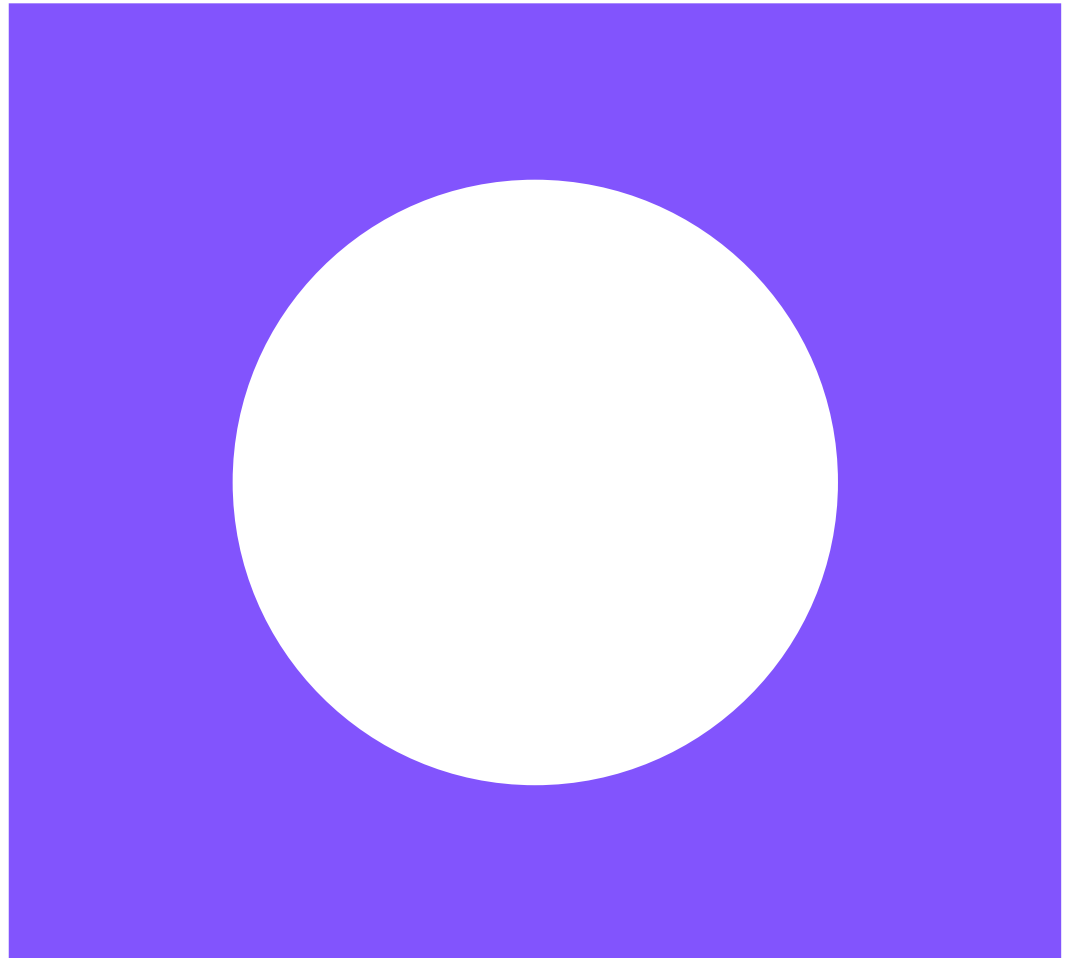
9.7.1 Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. Table 9.7 summarises the potential effects and any residual effects as a result of the Project.

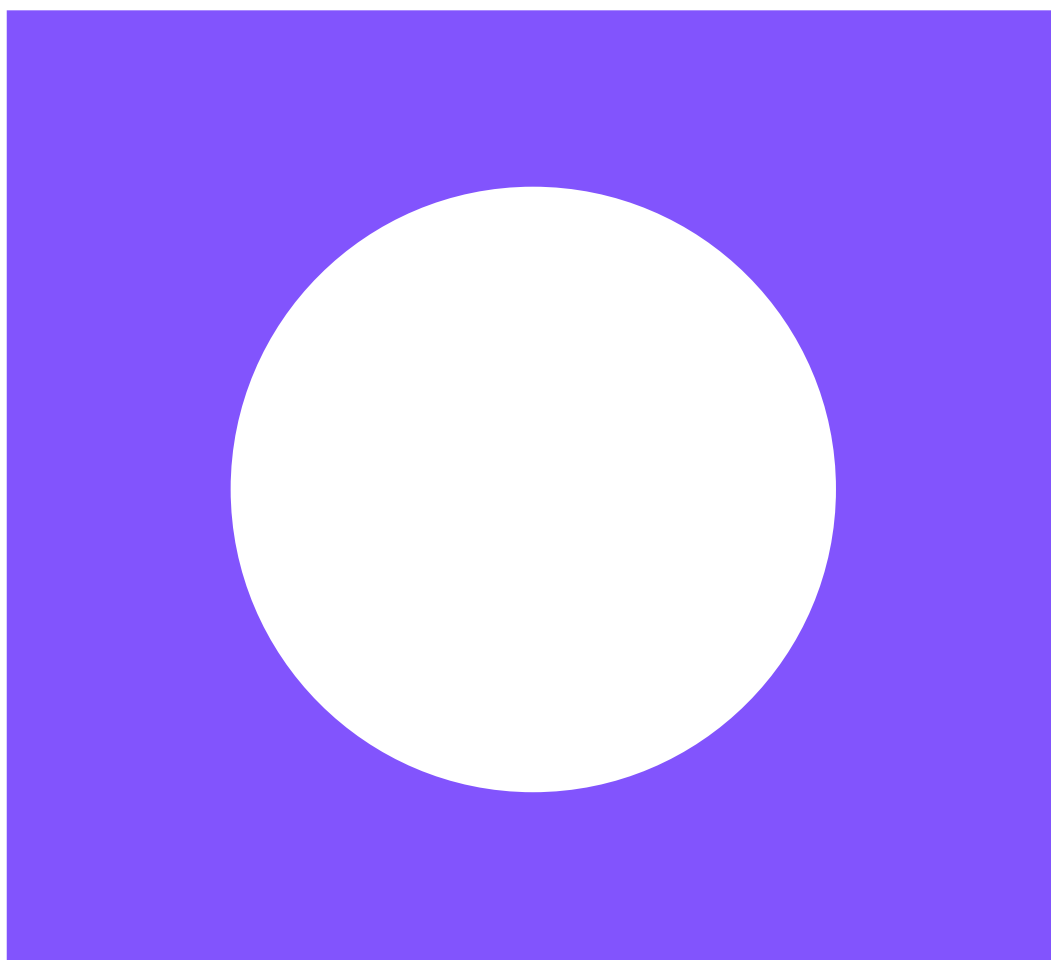
**Table 9.7: Summary of residual effects for geology and soils**

| Description of effect                          | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                             | Residual effect              | Proposed monitoring                                      |
|------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------|
| <b>Construction phase – Land Contamination</b> |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                              |                                                          |
| People – airport passengers                    | Temporary              | Medium                  | Moderate            | Moderate Adverse (Significant)                      | Current ground investigation and remediation are focused on the fuel farm.<br><br>If potentially contaminated material is encountered elsewhere, it will be recorded and assessed, with mitigation undertaken as needed in line with regulatory and lender requirements.                                                                                                                          | Negligible (Not Significant) | Continue fuel farm area quarterly groundwater monitoring |
| People – airport workers                       | Temporary              | Medium                  | Negligible          | Negligible (Not Significant)                        | Current ground investigation and remediation are focused on the fuel farm.<br><br>If potentially contaminated material is encountered elsewhere, it will be recorded and assessed, with mitigation undertaken as needed in line with regulatory and lender requirements.<br><br>Where asbestos or other hazardous materials (e.g. toxic mould, radiological contaminants) are suspected, engage a | Negligible (Not Significant) | Continue fuel farm area quarterly groundwater monitoring |

| Description of effect                         | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                | Residual effect              | Proposed monitoring                                      |
|-----------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------|
|                                               |                        |                         |                     |                                                     | qualified specialist to assess and manage risks in line with regulatory requirements.                                                                                                                                                                                |                              |                                                          |
| People – nearby residents                     | Temporary              | Medium                  | Moderate            | Moderate Adverse (Significant)                      | Current ground investigation and remediation are focused on the fuel farm.<br>If potentially contaminated material is encountered elsewhere, it will be recorded and assessed, with mitigation undertaken as needed in line with regulatory and lender requirements. | Negligible (Not Significant) | Continue fuel farm area quarterly groundwater monitoring |
| Built environment                             | Temporary              | Medium                  | Moderate            | Moderate Adverse (Significant)                      | Current ground investigation and remediation are focused on the fuel farm.<br>If potentially contaminated material is encountered elsewhere, it will be recorded and assessed, with mitigation undertaken as needed in line with regulatory and lender requirements. | Negligible (Not Significant) | Continue fuel farm area quarterly groundwater monitoring |
| <b>Operational phase – Land Contamination</b> |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                      |                              |                                                          |
| People – airport Passengers                   | Permanent              | Medium                  | Minor               | Minor Adverse (Not Significant)                     | N/A                                                                                                                                                                                                                                                                  | Minor (Not Significant)      | Continue fuel farm area quarterly                        |

| Description of effect              | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                           | Residual effect              | Proposed monitoring                                      |
|------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|---------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------|
|                                    |                        |                         |                     |                                                     |                                                                                 |                              | groundwater monitoring                                   |
| People – airport workers           | Permanent              | Medium                  | Minor               | Minor Adverse (Not Significant)                     | N/A                                                                             | Negligible (Not Significant) | Continue fuel farm area quarterly groundwater monitoring |
| People – nearby residents          | Permanent              | Medium                  | Negligible          | Negligible (Not Significant)                        | N/A                                                                             | Negligible (Not Significant) | Continue fuel farm area quarterly groundwater monitoring |
| Built environment                  | Permanent              | Low                     | Minor               | Negligible (Not Significant)                        | N/A                                                                             | Negligible (Not Significant) | Continue fuel farm area quarterly groundwater monitoring |
| <b>Operational phase – Seismic</b> |                        |                         |                     |                                                     |                                                                                 |                              |                                                          |
| Built environment and people       | Permanent              | Not assessed            | Not assessed        | Not assessed                                        | Ground investigation and construction according to design codes for earthquakes | Not assessed                 | None                                                     |





# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 10

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 10**

September 2025



# Issue and Revision Record

| Revision | Date       | Originator | Checker | Approver | Description                                |
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| C        | 17/09/2025 | SM         | KD      | BM       | Minor updates following external comments  |
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|          |            |            |         |          |                                            |
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|          |            |            |         |          |                                            |
|          |            |            |         |          |                                            |

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# Contents

|                                     |    |
|-------------------------------------|----|
| Acronyms and abbreviations          | 1  |
| 10 Greenhouse gases                 | 2  |
| 10.1 Introduction                   | 2  |
| 10.2 Methodology                    | 2  |
| Applicable guidelines and standards | 2  |
| National requirements               | 2  |
| Area of Influence                   | 3  |
| Methodological approach             | 3  |
| Limitations and assumptions         | 5  |
| 10.3 Baseline                       | 6  |
| Current baseline                    | 6  |
| Future baseline                     | 7  |
| 10.4 Potential impacts              | 7  |
| 10.5 Assessment of effects          | 8  |
| Construction phase effects          | 8  |
| Operational phase effects           | 9  |
| Summary                             | 10 |
| 10.6 Mitigation                     | 11 |
| 10.7 Summary of residual effects    | 12 |

## Tables

|                                                              |    |
|--------------------------------------------------------------|----|
| Table 10.1: Estimation approach per emission source          | 4  |
| Table 10.2: Construction materials assumptions               | 5  |
| Table 10.3: Limitations of emission estimates                | 6  |
| Table 10.4: 2024 Carbon Footprint Report – ALA baseline      | 7  |
| Table 10.5: Carbon Footprint Report – ALA projection         | 10 |
| Table 10.6: Summary of residual effects for greenhouse gases | 13 |

## Figures

|                                                                     |    |
|---------------------------------------------------------------------|----|
| Figure 10.1: Construction materials – emissions breakdown           | 9  |
| Figure 10.2: Plant and equipment fuel – emissions breakdown         | 9  |
| Figure 10.3: Emissions breakdown by source                          | 10 |
| Figure 10.4: Project Impact – 2024 to future projections comparison | 11 |

# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                                  |
|------------------------|-------------------------------------------------------------|
| ACERT                  | Airport Carbon and Emissions Reporting Tool                 |
| AGL                    | Airfield Ground Lighting                                    |
| ALA                    | Almaty International Airport                                |
| APU                    | Auxiliary Power Unit                                        |
| DEFRA                  | Department for Environment, Food and Rural Affairs          |
| EF                     | Emission factor                                             |
| EPC                    | Engineering, Procurement, and Construction (EPC) Contractor |
| EPD                    | Environmental Product Declaration                           |
| ESAP                   | Environmental and Social Action Plan                        |
| ESIA                   | Environmental And Social Impact Assessment                  |
| ESMP                   | Environmental and Social Management Plan                    |
| GDP                    | Gross Domestic Product                                      |
| GHG                    | Greenhouse Gas                                              |
| GSE                    | Ground Support Equipment                                    |
| ICE                    | Inventory of Carbon and Energy                              |
| IFC                    | International Finance Corporation                           |
| LTA                    | Lender's Technical Advisor                                  |
| PGS                    | Pavement Grading System                                     |
| PVC                    | Polyvinyl Chloride                                          |
| t CO <sub>2</sub> e    | Tonnes of carbon dioxide equivalent                         |
| UNFCCC                 | United Nations Framework Convention on Climate Change       |

# 10 Greenhouse gases

## 10.1 Introduction

- 10.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) reports the findings of an assessment of potential significant environmental effects associated with greenhouse gas (GHG) emissions resulting from the Project.
- 10.1.2 An assessment of potential significant effects has been undertaken for each of the sensitive receptors identified in the study area. Where appropriate, commitments to mitigation measures have been made to manage potential impacts on these receptors.

## 10.2 Methodology

### Applicable guidelines and standards

- 10.2.1 In addition to the applicable overarching policy and legislation for the Project that is presented in ESIA Chapter 3: Policy, legal and institutional framework, the following section presents further policy and legislation which specifically relates to GHG for the Project.

### National requirements

- 10.2.2 Kazakhstan has the following legal framework relating to GHG emissions:
- Nationally Determined Contributions (2023)<sup>1</sup>: Kazakhstan ratified the Paris Agreement and has committed to reducing its GHG emissions. In 2023, Kazakhstan submitted its revised NDC to include more ambitious targets and detailed plans to achieve them. This includes quantifiable targets with time frames, such as a reduction in the energy intensity of the Gross Domestic Product (GDP) from the 2008 level by 50% by 2050 and increasing alternative sources of electricity generation to 50% by 2050 – currently accounting for under 10%.
  - Development Strategy of Kazakhstan Until 2050 (2012)<sup>2</sup> Sets out the long-term basis for the development of the state planning system. One of the strategic objectives is the transition to a low-carbon economy. For example, by 2050, alternative and renewable energy should account for at least half of total national energy consumption.
  - Law on Energy Saving and Energy Efficiency (2012)<sup>3</sup>: Adopted in 2020, the law introduces requirements to implement energy saving policies and increase energy efficiency. The law makes it mandatory for entities that consume 1,500 tonnes or more of fuel equivalent per year to report annually on energy saving and efficiency measures. The law includes energy efficiency requirements for transport, applicable to road and air transport amongst others.
  - Order № 27301: Establishes the legal basis for regulating GHG emissions and absorption and aligns with Kazakhstan's Environmental Code and internal obligations. This applies to all legal entities and individuals engaged in activities that emit or absorb GHGs.

---

<sup>1</sup> Kazakhstan (2023), Updated Nationally Determined Contribution of the Republic of Kazakhstan to the global response to climate change. Available online: [Kazakhstan First NDC \(Updated submission\) | UNFCCC](#). Accessed July 2025.

<sup>2</sup> Astana (2012), Strategy Kazakhstan-2050. Available online: [Presidential Address 'Strategy Kazakhstan-2050' \(EN\).pdf](#). Accessed July 2025.

<sup>3</sup> IEA (2022), Kazakhstan Energy Conservation and Energy Efficiency Law. Available online: [Kazakhstan Energy Conservation and Energy Efficiency Law – Policies - IEA](#). Accessed July 2025.

## International requirements

- 10.2.3 Kazakhstan has signed up the following international agreements relating to GHG emissions:
- United Nations Framework Convention on Climate Change (UNFCCC)<sup>4</sup>: ratified May 1995.
  - Kyoto Protocol to the United Nations Framework Convention on Climate Change<sup>5</sup>. The UNFCCC reporting guidelines on annual inventories requires all Parties to submit to the Conference of the Parties an annual national anthropogenic GHG emissions inventory of all GHG not covered by the Montreal Protocol. As a non-Annex I Party, Kazakhstan has no obligations to reduce GHG emissions under this protocol.

## Area of Influence

- 10.2.4 This chapter will consider the emissions resulting from the Project activities associated with the construction and operational stages. It is noted that unlike some other impacts, the nature of GHG emissions means that the ultimate receptor is the global climate system. Climate change resulting from GHG emissions will lead to social, environmental and economic impacts felt globally, regardless of where the GHGs are emitted. The area of influence associated with the GHGs are the emission sources which will have an impact on global climate, and country emissions.

## Methodological approach

- 10.2.5 This section of the chapter presents the methodology applied to the assessment of impacts.
- 10.2.6 The assessment identifies the major potential sources of GHG. **Error! Reference source not found.** summarises the emission sources. These align with the GHG Protocol guidance which classifies GHG emissions into three “scopes”.
- 10.2.7 The assessment identifies the major potential sources of GHG. These sources align with the GHG Protocol guidance which classifies GHG emissions into three “scopes”. The sources of emissions assessed is as follows:
- Scope 1: Direct Emissions Airport Operator
    - 1.1 Vehicles (incl. airside transport, machinery, GSE)
    - 1.2 Buildings (boilers, furnaces)
    - 1.3 Emergency Generator
    - 1.4 Fire training
    - 1.5 Refrigerants
    - 1.8 De-icing chemicals
    - 1.9 Other emitting sources
  - Scope 2: Airport Operator Net Energy from External Supplier
    - 2.1 Electricity purchased
    - 2.2 Heat purchased
  - Scope 3: Upstream and downstream indirect emissions
    - 3.1 Construction - plant and equipment fuel use
    - 3.2 Construction - raw materials (for pavements, drainage, airfield ground lighting, fence)

---

<sup>4</sup> United Nations Treaty Collection (2021) United Nations Framework Convention on Climate Change. Available at: [UNTC](#). Accessed July 2025.

<sup>5</sup> OECD (2016) Financing Climate Action in Kazakhstan. Available at: [The Organisation for Economic Co-operation and Development | OECD](#). Accessed July 2025.

– 3.3 Operation – flights

- 10.2.8 Note that the following emissions sources have been excluded: construction of new buildings (insufficient data at this stage); temporary worker accommodation (assumed not relevant - workers expected to be accommodated in existing buildings within the airport surrounding region); aircraft on stand: auxiliary power unit (APU) (insufficient data at this stage); land-use change (considered negligible as no significant land use change); and terminal energy use (insufficient data at this stage).
- 10.2.9 Typically, when calculating GHG emissions, activity or consumption data is multiplied by a published emission factor from a recognised source:
- $$\text{Emissions (tCO}_2\text{e)} = \text{rate of activity (unit)} \times \text{emission factor (tCO}_2\text{e/unit)}$$
- 10.2.10 For each source, the activity data and emission factor should be selected using the best available project data and emission factors – this method is consistent with the calculation approach adopted by International Finance Corporation (IFC).
- 10.2.11 In addition, an uplift factor of 10% was used to adjust the total GHG inventory to account for relevant emissions which cannot be reasonably quantified or estimated, such as APU and terminal energy use emissions.
- 10.2.12 Table 10.1 sets out the emissions sources considered and summarises the methods used for GHG estimation.

**Table 10.1: Estimation approach per emission source**

| Emission Source |                                                                          | Estimation approach                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Construction    | Raw materials (for pavements, drainage, airfield ground lighting, fence) | <p>The materials and respective quantities used for construction were provided for the following project components:</p> <ul style="list-style-type: none"> <li>● Full depth reconstruction of main runway</li> <li>● New taxiway</li> <li>● New cargo apron</li> <li>● Full depth reconstruction of existing VIP apron</li> <li>● New de-icing pad</li> <li>● Rehabilitation of parking stands</li> </ul> <p>The emission factors used were sourced from the Inventory of Carbon and Energy (ICE) V4<sup>6</sup> database. Where the emission factor was not available in this database, Environmental Product Declaration (EPDs)<sup>7</sup> which reflect a representative material were used.</p> |
|                 | Plant and equipment fuel use                                             | <p>Fuel consumption data was provided for the different vehicles used in the construction of the project components which are part of the YDA scope of works:</p> <ul style="list-style-type: none"> <li>● Full depth reconstruction of main runway</li> <li>● New taxiway</li> <li>● New cargo apron</li> <li>● Full depth reconstruction of existing VIP apron</li> <li>● New de-icing pad</li> <li>● Rehabilitation of parking stands</li> </ul> <p>The emission factor used was of 2.6988kgCO<sub>2</sub>e/litre, as used in the baseline. This is sourced from DEFRA, 2022 UK GHG conversion factors, full set.</p>                                                                              |

<sup>6</sup> ICE (2024) Available at: [Embodied Carbon Footprint Database - Circular Ecology](#). Last accessed July 2025.

<sup>7</sup> EPDs were used where material data was not available on embodied carbon databases. EPDs were obtained from a variety of online sources e.g. manufacturer's website.

| Emission Source |                                                        | Estimation approach                                                                    |
|-----------------|--------------------------------------------------------|----------------------------------------------------------------------------------------|
| Operation       | Onsite electricity consumption from Project components | Emissions are based on studies completed by WSP for the Project Horizon <sup>8</sup> . |
|                 | Emissions from flights                                 | Emissions are based on studies completed by WSP for the Project Horizon <sup>8</sup> . |

- 10.2.13 The assessment separates construction and operational emissions to align with standard ESIA practice and ensure consistency across environmental topics such as air quality and traffic. This approach allows for clearer identification of impacts and mitigation measures at each stage of the Project. While a full lifecycle assessment was not undertaken, Section 10.5 provides a whole-life summary of emissions, offering a comprehensive view of the Project's overall carbon footprint.

### Limitations and assumptions

- 10.2.14 The impacts presented are an estimation based on the available data, intended to provide an indication of the level of impact of the Project.
- 10.2.15 The construction footprint of the Project is based on a high-level assessment of the main materials required and anticipated fuel-use for construction. Additionally, there is uncertainty within emissions factors themselves as they represent industry averages and are calculated on a set of assumptions and thus may not reflect real world scenarios or specific products that are later used in the construction. The final carbon footprint is likely to be different to the estimation presented here as it is dependent on the final products selected and the fuel used on site.
- 10.2.16 Several assumptions were made to calculate the GHG emissions from construction materials, this is due to the level of detail included in the data provided. These assumptions are summarised in Table 10.2.

**Table 10.2: Construction materials assumptions**

|                                | Material                                      | Calculation Assumption                                                                    |
|--------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------|
| Pavements                      | Fly ash                                       | Density: 600kg/m <sup>3</sup>                                                             |
|                                | Capping Layer (Pavement Grading System (PGS)) | Assume similar materials to aggregate<br>Density: 2240kg/m <sup>3</sup> (ICE V4)          |
|                                | Crushed aggregate                             | Density: 2240kg/m <sup>3</sup> (ICE V4)                                                   |
|                                | Aggregate                                     | Density: 2240kg/m <sup>3</sup> (ICE V4)                                                   |
|                                | Sealing cord made of foamed polyethylene      | Diameter: 10mm, and 0.02kg/m                                                              |
|                                | Bituminous mastic                             | Primary material is bitumen and no specific EPD available.<br>1.8kg/L                     |
| Stormwater drainage            | Polyvinyl Chloride (PVC) pipe 300mm diameter  | Assumes thickness: 18.7 mm<br>Density: 1400kg/m <sup>3</sup><br>Weight per meter: 25 kg/m |
|                                | Drainage manholes                             | Material: reinforced concrete                                                             |
|                                | Corrugated drainage pipe                      | Material: plastic<br>Diameter: 300mm, and 4.2kg/m                                         |
| Marking                        | Reflective paint for marking                  | Density: 1.5kg/l                                                                          |
| Airfield Ground Lighting (AGL) | Airfield manholes (F900-D400)                 | Material: reinforced concrete                                                             |
|                                | Bare coppers for earthing                     | Assume cross section: 16mm <sup>2</sup> - 0.142kg/m                                       |

<sup>8</sup> WSP (2025) Chapter 6: Emissions Estimation, Draft Red Flag Report 10th July 2025. 2025UK383375

- 10.2.17 Additional assumptions include:
- The assessment of GHG emissions from construction fuel was based on data provided and it has been assumed this is the most representative source of data.
  - Annual electricity consumption figures were assumed to be static across the operational years, as well as Kazakhstan's grid's emission factors (assumed no decarbonisation). This would result in emissions from operation being equal across all operational years.
  - Emissions were assessed over a 6-year operational period, based on ALA currently exploring development scenarios extending to 2030.
- 10.2.18 The limitations of the GHG emissions estimates are summarised in Table 10.3.

**Table 10.3: Limitations of emission estimates**

| Emission Source |                                                                          | Limitations                                                                                                                                                                                                                                                                                                                                        |
|-----------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Construction    | Raw materials (for pavements, drainage, airfield ground lighting, fence) | The assumptions made for construction materials were based on previous project experience and have been conservative. However, they may not be accurate to what is being constructed on site. Additionally, the calculations only cover the first six Project components as described in Table 2.1 of <b>ESIA Chapter 2: Project description</b> . |
|                 | Plant and equipment fuel use                                             | The calculations only cover the first six Project components as described in Table 2.1 of <b>ESIA Chapter 2: Project description</b> .                                                                                                                                                                                                             |

- 10.2.19 This ESIA does not include an assessment of decommissioning or demolition activities, as these are not anticipated within the foreseeable planning horizon of the Project.
- 10.2.20 The Scope 3 assessment for flights is provided in Appendix 10.A.
- 10.2.21 Based on professional opinion, these limitations will be covered by a generic uplift factor of 10%, which excludes air traffic emissions, and addresses the uncertainty in GHG emissions estimates.

## 10.3 Baseline

### Current baseline

- 10.3.1 In 2024, ALA conducted a desk-based quantitative assessment to evaluate the impact of its investment plans for 2025, 2026, and 2027 on climate change, as part of Project Horizon. This assessment, documented in a report prepared by Rever Academi, included a GHG inventory and identified carbon reduction strategies such as implementing energy efficiency projects, increasing the use of renewable energy sources, and delivering training and awareness programs for employees.
- 10.3.2 ALA has committed to achieving level 3 Airport Carbon Accreditation (ACA) by 2030 as part of its carbon reduction strategy. The action plan focuses on carbon management and energy reduction initiatives, with additional use of offsetting for residual emissions. The mitigations outlined in this report would help ALA achieve this goal.
- 10.3.3 Baseline Scope 3 emissions were sourced from studies completed for the Project Horizon (WSP, 2025). The emissions were estimated for the year 2024 using each flight distance, estimated fuel burnt per flight and a carbon emission factor of 3.16kg CO<sub>2</sub>e per kg of fuel burn. The estimated emissions included passenger, cargo and other flight types. As shown in Table 10.4, indirect emissions from flights' fuel currently contribute the greatest to the carbon footprint of the airport (99%).



- 10.3.4 Note that the baseline data does not provide a full estimation of the airport's emissions as it excludes emissions such as those from APUs and terminal energy use.

**Table 10.4: 2024 Carbon Footprint Report – ALA baseline**

| Source                                                      |                                                            | Group      | Entity           | t CO <sub>2</sub> e | % CO <sub>2</sub> e |
|-------------------------------------------------------------|------------------------------------------------------------|------------|------------------|---------------------|---------------------|
| Scope 1: Direct Emissions Airport Operator                  |                                                            |            |                  |                     |                     |
| 1.1                                                         | Vehicles (incl. airside transport, machinery, GSE)         | Mobile     | Airport Operator | 4,955.3             | 0.18%               |
| 1.2                                                         | Buildings (boilers, furnaces)                              | Stationary | Airport Operator | 213.8               | 0.01%               |
| 1.3                                                         | Emergency Generator                                        | Stationary | Airport Operator | 7.3                 | 0.00%               |
| 1.4                                                         | Fire Training                                              | Process    | Airport Operator | 0.1                 | 0.00%               |
| 1.5                                                         | Refrigerants                                               | Process    | Airport Operator | 1,562.4             | 0.06%               |
| 1.6                                                         | Solid Waste                                                | Process    | Airport Operator | -                   | 0.00%               |
| 1.7                                                         | Waste Water (on-site)                                      | Process    | Airport Operator | -                   | 0.00%               |
| 1.8                                                         | De-icing chemicals                                         | Process    | Airport Operator | 913.9               | 0.03%               |
| 1.9                                                         | Other emitting sources                                     | Process    | Airport Operator | 0.1                 | 0.00%               |
| Subtotal                                                    | Airport Operator Scope 1                                   |            |                  | 7,653               | 0.28%               |
| Scope 2: Airport Operator Net Energy from External Supplier |                                                            |            |                  |                     |                     |
| 2.1                                                         | Electricity purchased, Location-based emission factor (EF) | Energy     | Airport Operator | 19,495.4            | 0.71%               |
| 2.2                                                         | Heat purchased                                             | Energy     | Airport Operator | 3,730.0             | 0.14%               |
| Subtotal                                                    | Airport Operator Scope 2                                   |            |                  | 23,225.4            | 0.85%               |
| Airport Operator Gross Sub-total (Scopes 1 & 2)             |                                                            |            |                  | 30,878.2            | 1.13%               |
| Scope 3: Upstream and downstream indirect emissions         |                                                            |            |                  |                     |                     |
| Subtotal Air Transport Scope 3                              |                                                            |            |                  | 2,708,000           | 98.87%              |
| Total                                                       |                                                            |            |                  | 2,738,878           | 100.00%             |

## Future baseline

- 10.3.5 Future baseline GHG emissions associated with airport operations are not expected to increase in line with the increasing number of flights over time, due to improvements in aircraft fuel efficiency, increased use of sustainable aviation fuels (SAFs), and potential shifts toward electrification of ground support equipment and airport vehicle fleets. These advancements, alongside broader decarbonisation efforts in the aviation sector, may help offset increases in air traffic expected even without the Project.

## 10.4 Potential impacts

- 10.4.1 The assessment outlines several potential impacts on climate change from the Project construction and operation:

- Construction materials are the largest contributor to the GHG emissions quantified in this assessment, over 6 years of operation. There will be additional emissions from the construction materials used in the Project components that have not been quantified: the project components 7 – 14, identified in Table 2.1 of **ESIA Chapter 2: Project description**.
- Construction fuel for the project components 1 – 6, as identified in Table 2.1 of **ESIA Chapter 2: Project description**, is the second largest contributor to the total emissions quantified in this assessment. Additional emissions will result from the fuel used in the construction of the remaining Project components.

- Annual emissions for the electricity used during operation of all Project components will contribute to the total GHG emissions and will occur each year of airport operation.

10.4.2 The Scope 3 assessment for flights is provided in Appendix 10.A. The impact of emissions from future air traffic is expected to be significant and become the largest contributor to the total GHG emissions, as shown in the current 2024 baseline.

10.4.3 Unlike other impacts, the nature of GHG emissions means that the ultimate receptor is the global climate system. GHG emissions are by their nature cumulative, as the global increase in emissions increase the impacts on climate change. In the context of this report, GHG emissions are considered in the context of the impact from the Project emissions with no separate cumulative impact assessment.

## 10.5 Assessment of effects

10.5.1 Impacts and significance of the resulting effects have been assessed taking into account the interaction between magnitude of the impacts and sensitivity of the receptors.

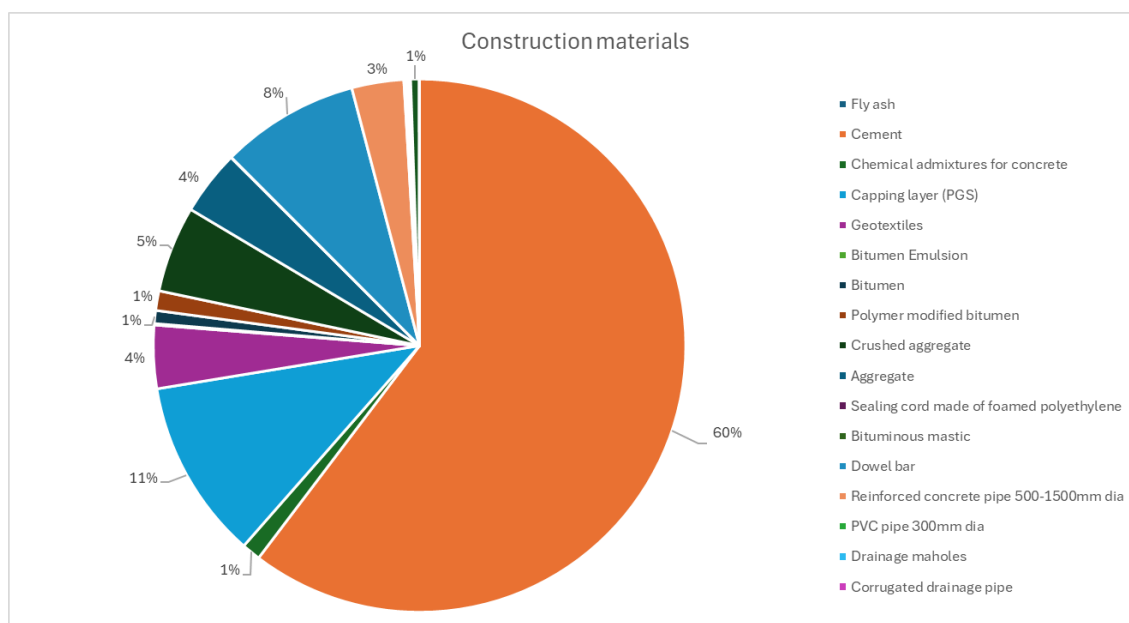
- **Magnitude** – there is currently no globally accepted threshold of GHG emissions which, if exceeded, can be defined as significant from an Environmental Impact Assessment perspective. There are various forms of guidance and industry standards available, and it is of note that the guidance on evaluating significance of GHG emissions published by The Institute of Sustainability & Environmental Professionals (ISEP) advises that all GHG emissions should be considered significant, regardless of the scale of the emissions. In line with this guidance, all GHG emissions are considered to have a magnitude of major or moderate adverse.
- **Sensitivity** – the nature of GHG emissions means that the ultimate receptor is the global climate system. Given the nature of climate change and the global need to reduce GHG emissions to limit the degree of global warming expected, the global climate system can be considered as highly sensitive to additional GHG emissions.

### Construction phase effects

10.5.2 The construction of the Project will lead to emissions of GHGs through the manufacture of materials, transport of materials, and use of construction plant. The emissions estimated are 'Scope 3 (indirect)' as they result from activities of other organisations, e.g. manufacture of raw materials.

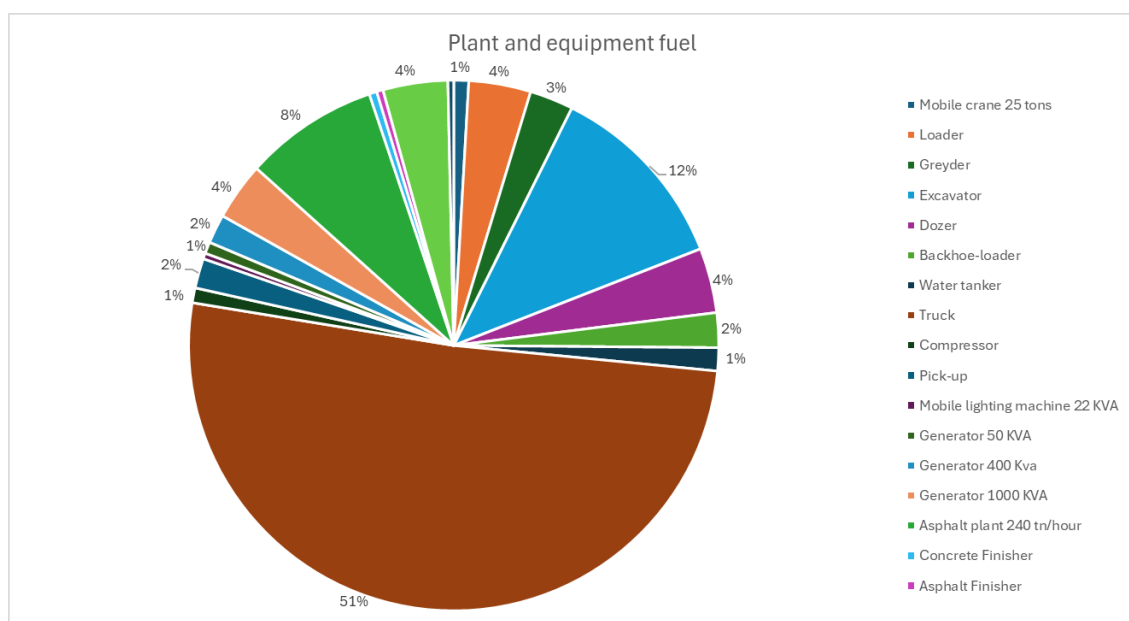
10.5.3 These emissions from construction materials, estimated as per previous sections, result in 38% of total emissions quantified in this study, with a total of 189,821 tCO<sub>2</sub>e. The largest contributor to the material's GHG emissions is cement accounting for 60%, followed by steel used in dowel bars, 11%. The breakdown of construction materials to be used is shown in Figure 10.1.

**Figure 10.1: Construction materials – emissions breakdown**



10.5.4 The emissions resulting from construction plant and equipment fuel use result in around 73,018 tCO<sub>2</sub>e, which is 15% of overall emissions quantified. Figure 10.2 shows the largest proportion of emissions from fuel use arises from trucks.

**Figure 10.2: Plant and equipment fuel – emissions breakdown**



## Operational phase effects

10.5.5 As mentioned in the baseline description, an assessment to quantify the impacts of the Project for the years of 2025, 2026 and 2027 on climate change was undertaken in 2024. This included Scope 1 emissions – sources 1.1 to 1.9 in the table below, as well as Scope 2 emissions for the existing airport plus the additional facilities (WSP, 2025).

10.5.6 The Scope 3 assessment for flights is provided in Appendix 10.A.

## Summary

10.5.7 The assessment outlines several potentially significant impacts on climate change. The key impacts are from the production of construction materials, as shown in Table 10.5, particularly cement, followed by electricity and heat purchased during the operational period of 6 years.

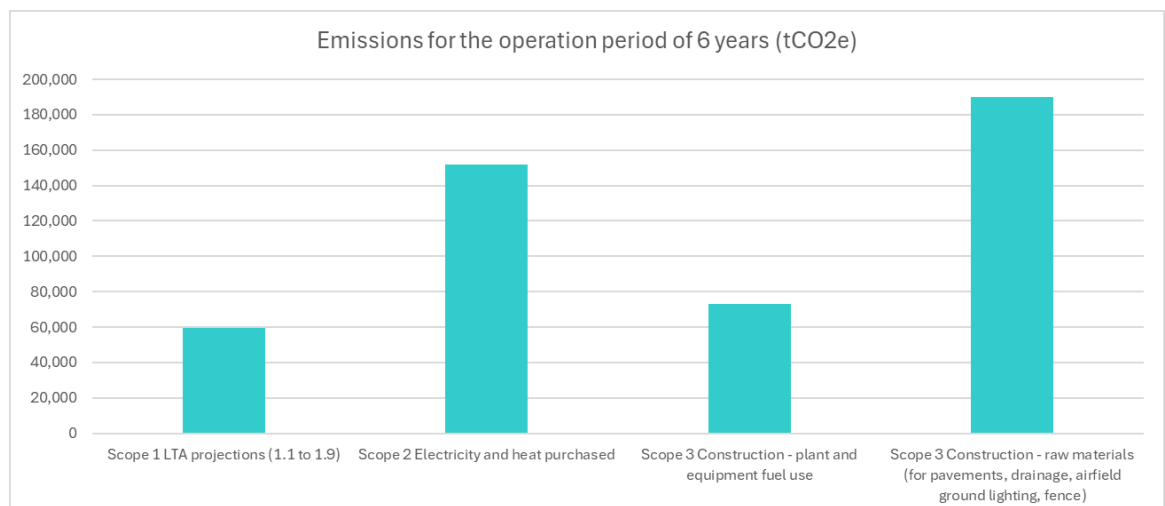
**Table 10.5: Carbon Footprint Report – ALA projection**

| Source                                                      |                                                                                         | t CO <sub>2</sub> e*    | % CO <sub>2</sub> e     |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------|-------------------------|
| Scope 1: Direct Emissions Airport Operator                  |                                                                                         |                         |                         |
| 1.1                                                         | Vehicles (incl. airside transport, machinery, GSE)                                      |                         |                         |
| 1.2                                                         | Buildings (boilers, furnaces)                                                           |                         |                         |
| 1.3                                                         | Emergency Generator                                                                     |                         |                         |
| 1.4                                                         | Fire training                                                                           | 59,750                  | 13%                     |
| 1.5                                                         | Refrigerants                                                                            |                         |                         |
| 1.8                                                         | De-icing chemicals                                                                      |                         |                         |
| 1.9                                                         | Other emitting sources                                                                  |                         |                         |
| <b>Subtotal</b>                                             | <b>Airport Operator Scope 1</b>                                                         | <b>59,750</b>           |                         |
| Scope 2: Airport Operator Net Energy from External Supplier |                                                                                         |                         |                         |
| 2.1 and 2.2                                                 | Electricity and heat purchased                                                          | 151,980                 | 32%                     |
| <b>Subtotal</b>                                             | <b>Airport Operator Scope 2</b>                                                         | <b>151,980</b>          |                         |
| <b>Airport Operator Gross Sub-total (Scopes 1 &amp; 2)</b>  |                                                                                         | <b>211,730</b>          |                         |
| Scope 3: Upstream and downstream indirect emissions         |                                                                                         |                         |                         |
| 3.1                                                         | Construction - raw materials (for pavements, drainage, airfield ground lighting, fence) | 189,820                 | 40%                     |
| 3.2                                                         | Construction - plant and equipment fuel use                                             | 73,020                  | 15%                     |
| 3.3                                                         | Operation – flights                                                                     | Refer to Appendix 10.A. | Refer to Appendix 10.A. |
| <b>Subtotal Air Transport Scope 3 (excluding flights)</b>   |                                                                                         | <b>262,840</b>          |                         |
| <b>Total</b>                                                |                                                                                         | <b>474,570</b>          | <b>100%</b>             |

\* emissions rounded to nearest 10 tonnes, totals may not sum due to rounding

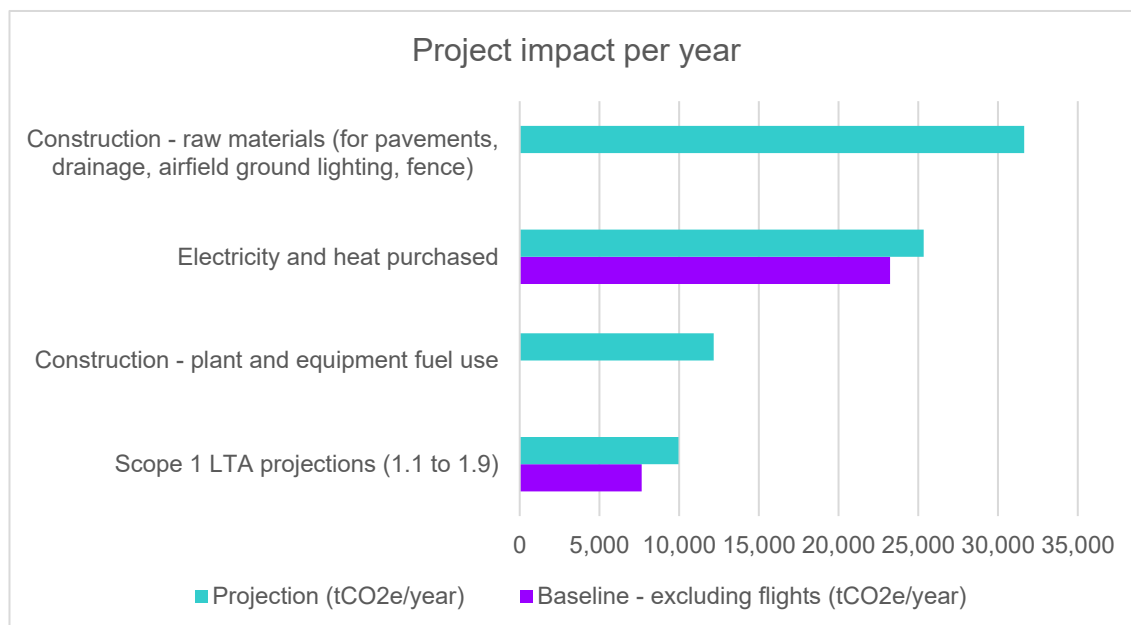
10.5.8 A summary of emission sources is shown in Figure 10.3.

**Figure 10.3: Emissions breakdown by source**



10.5.9 The impact of the Project has been highlighted in this ESIA. This is a significant development and therefore, there will be an increase in emissions, every operational year. Figure 10.4 below summarises the results to the 2024 baseline, excluding flights, compared to the future projection estimated emissions. It shows a yearly increase of 23% on Scope 1 emissions and 8% increase in Scope 2 emissions from electricity and heat purchased. The Scope 3 assessment for flights is provided in Appendix 10.A.

**Figure 10.4: Project Impact – 2024 to future projections comparison**



## 10.6 Mitigation

10.6.1 Mitigation measures to manage potential impacts from construction and operation of the Project are being implemented as part of the Environmental and Social Management Plan (ESMP) including:

- A plan to implement a GHG management system at the airport
- Limiting operating time of additional power supply installation (generators)
- Reduced aircraft taxi time with engine running
- Providing charging infrastructure to promote and facilitate the use of electric vehicles

10.6.2 These mitigation measures will control the GHG emissions from mobile sources and generators as well as ground vehicles. The lead Contractor will be responsible for ensuring the mitigation measures are implemented during the construction stages of the Project.

10.6.3 In addition to this, the sources of emissions may be reduced further by the following mitigations:

### Construction Phase:

- Using the carbon reduction hierarchy to focus efforts on 'build less', challenging the requirement for materials and exploring alternative approaches. This could include use of recycled materials in construction where possible, and reuse of materials on site.
- Implementing waste management strategies during construction works.
- Sourcing materials wherever possible locally to avoid transport emissions.
- Toolbox talks for workers about switching off plant and equipment when not in use.

- Regular plant and equipment servicing, and using grid electricity to power instead of fuel where possible given the lower carbon intensity.

**Operational phase:**

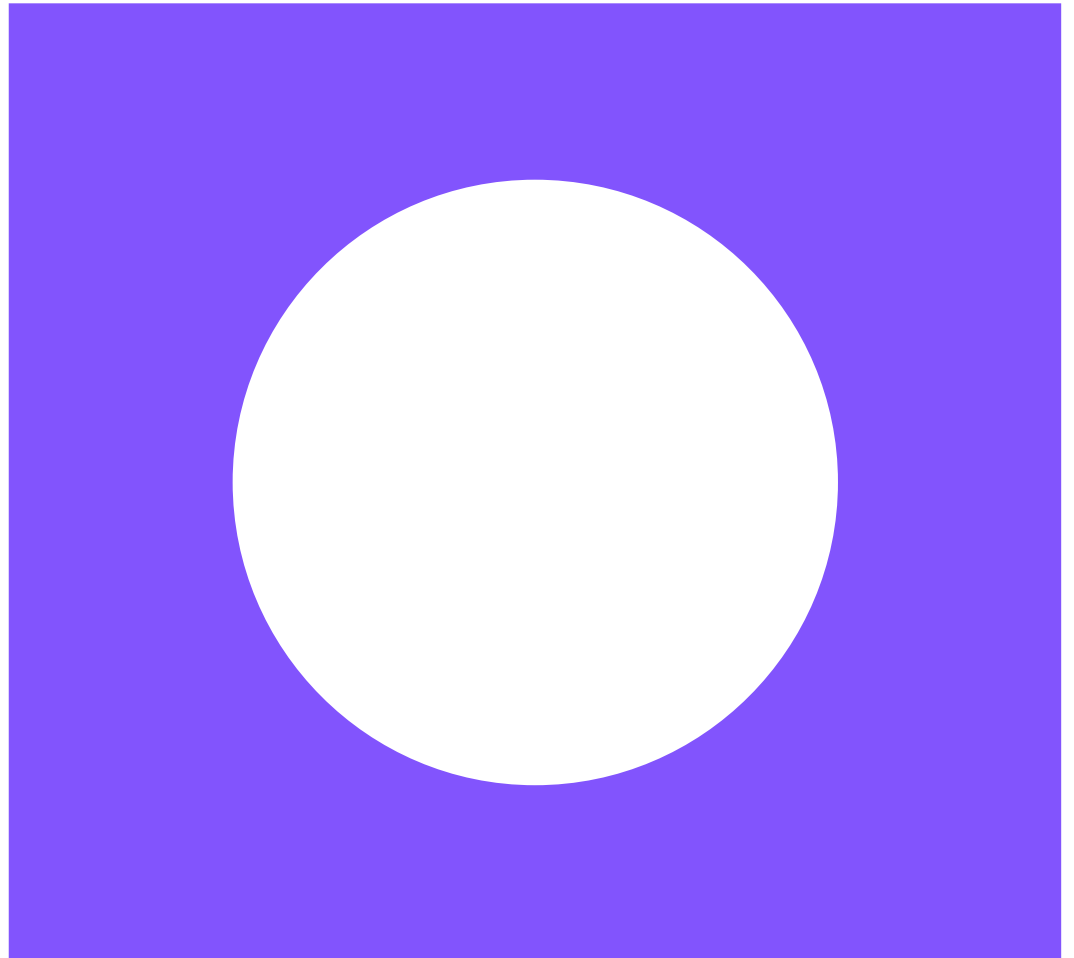
- Electrify operations where possible, including airside vehicles.
- Use or purchase renewable electricity for use in operations.
- Complete regular maintenance of on-site equipment and vehicles to ensure optimal operational efficiency.
- Implement buildings energy efficiency measures to reduce heating, cooling, and energy demands.
- ALA is recommended to explore opportunities to promote the future use of sustainable aviation fuels (SAF), in line with global decarbonisation trends. While implementation may be outside the current Project Horizon timeline and dependent on market readiness, airports such as Heathrow and Swedavia have adopted incentive-based approaches to support SAF uptake. Early positioning may support long-term climate goals and stakeholder expectations.

## 10.7 Summary of residual effects

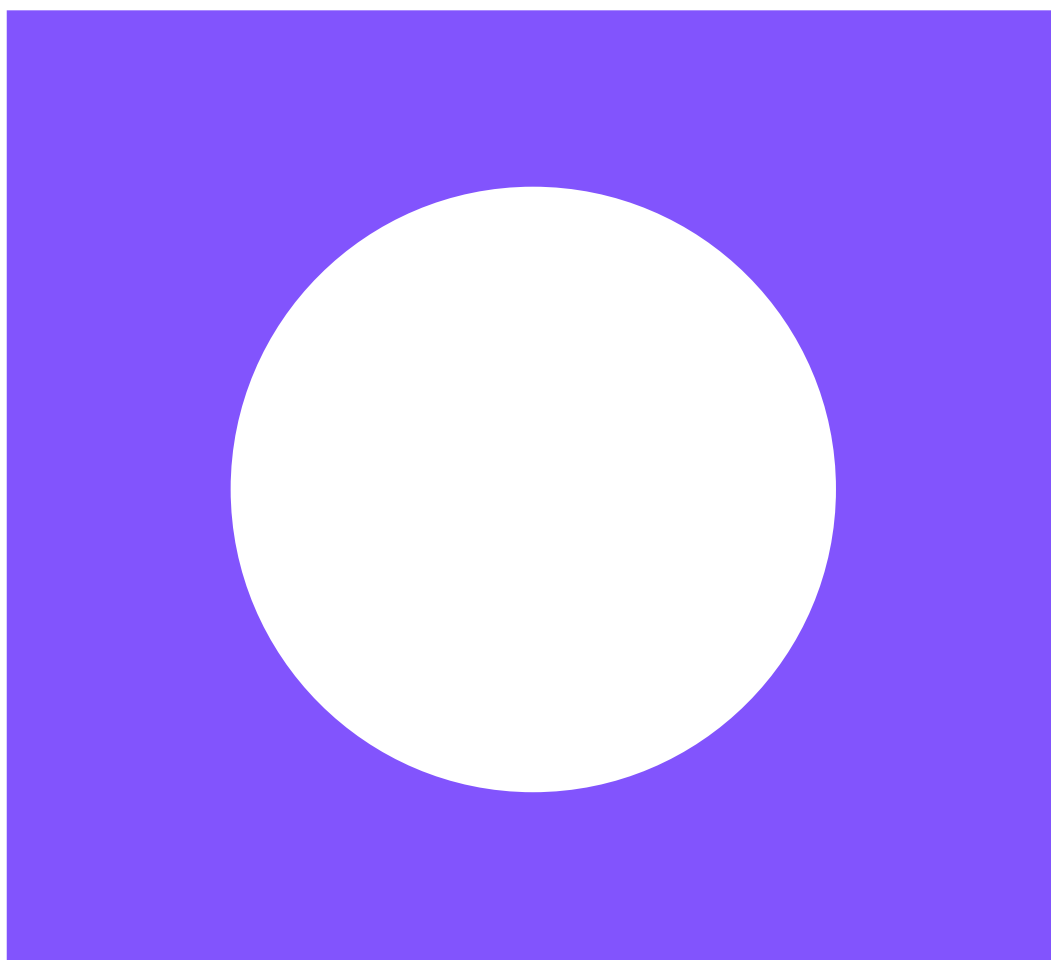
10.7.1 Residual effects after the application of mitigation are presented in Table 10.6.

**Table 10.6: Summary of residual effects for greenhouse gases**

| Description of effect                                  | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                  | Residual effect                | Proposed monitoring                                                                                                                                                                                |
|--------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction phase</b>                              |                        |                         |                     |                                                     |                                                                                                                                                        |                                |                                                                                                                                                                                                    |
| GHG emissions from production of construction material | Permanent              | High                    | Major               | Major adverse                                       | Proposed use of carbon reduction hierarchy.                                                                                                            | Moderate adverse (Significant) | None                                                                                                                                                                                               |
| GHG emissions from fuel used by construction plant     | Permanent              | High                    | Major               | Major adverse                                       | Use of lower carbon fuels, adherence to fuel efficiency measures, and selection of greener plant options where available.                              | Moderate adverse (Significant) | The EPC Contractor should produce a Construction monitoring plan to include vehicle and plant efficiency measures to encourage lower fuel use.<br><br>Plan to include staff training and guidance. |
| <b>Operational phase</b>                               |                        |                         |                     |                                                     |                                                                                                                                                        |                                |                                                                                                                                                                                                    |
| GHG emissions from electricity used in operation       | Permanent              | High                    | Moderate            | Major adverse                                       | Operational energy efficiency plan.<br><br>Use of renewable energy sources where available and possible.                                               | Moderate adverse (Significant) | Operational energy monitoring plan to include regular checks that equipment is running as per manufacture expectations and investigated where not the case.                                        |
| Increase in flights and resulting GHG emissions        | Permanent              | High                    | Major               | Major adverse                                       | ALA is recommended to explore opportunities to promote the future use of sustainable aviation fuels (SAF), in line with global decarbonisation trends. | Major adverse (Significant)    | None                                                                                                                                                                                               |







# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 11

October 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 11**

October 2025

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| B        | 17/09/2025 | EJ         | JC/AMS  | KD/BM    | Minor updates following external comments |
| C        | 03/10/2025 | AMS        | KD      | BM       | Minor updates following external comments |
|          |            |            |         |          |                                           |
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# Contents

|                                                             |    |
|-------------------------------------------------------------|----|
| Acronyms and abbreviations                                  | 1  |
| 11 Noise                                                    | 2  |
| 11.1 Introduction                                           | 2  |
| 11.2 Methodology                                            | 2  |
| Applicable guidelines and standards                         | 3  |
| Area of Influence for noise and vibration                   | 3  |
| Methodological approach                                     | 4  |
| Determining Magnitude, Sensitivity, and Impact Significance | 7  |
| Limitations and assumptions                                 | 9  |
| 11.3 Baseline                                               | 11 |
| Current baseline                                            | 11 |
| Future baseline                                             | 16 |
| 11.4 Potential impacts                                      | 16 |
| 11.5 Assessment of effects                                  | 17 |
| Construction phase effects                                  | 17 |
| Operational phase effects                                   | 21 |
| Conclusion                                                  | 30 |
| 11.6 Mitigation                                             | 31 |
| 11.7 Summary of residual effects                            | 32 |

## Tables

|                                                                                                                                          |    |
|------------------------------------------------------------------------------------------------------------------------------------------|----|
| Table 11.1: National noise standards of the Republic of Kazakhstan                                                                       | 4  |
| Table 11.2: WBG-IFC Noise level guidelines                                                                                               | 5  |
| Table 11.3: BS 5228 Part 2 guidance on the human perception effects of vibration due to construction activity and significance of effect | 6  |
| Table 11.4: BS 5228 Part 2 guidance on the human perception effects of vibration due to construction activity and significance of effect | 6  |
| Table 11.5: Comparison of noise and vibration limits and selected criteria                                                               | 7  |
| Table 11.6: Determination of Responsivity of Receptors                                                                                   | 7  |
| Table 11.7: Determination of Importance of Receptors                                                                                     | 7  |
| Table 11.8: Determination of Impact Magnitude                                                                                            | 8  |
| Table 11.9: Scale of Magnitude of Noise Impact                                                                                           | 8  |
| Table 11.10: Scale of Magnitude of Construction Vibration Impact                                                                         | 8  |
| Table 11.11: Summary of methodology for the identification of significant effects                                                        | 9  |
| Table 11.12: Reference Vibration Levels of Construction Equipment                                                                        | 10 |
| Table 11.13: Air Traffic Assumptions                                                                                                     | 11 |
| Table 11.14: Ground Support Equipment                                                                                                    | 11 |

|                                                                                                         |    |
|---------------------------------------------------------------------------------------------------------|----|
| Table 11.15: Summary of the baseline noise monitoring results (January to July 2025)                    | 12 |
| Table 11.16: Assessment points                                                                          | 13 |
| Table 11.17: Construction noise assessment results                                                      | 18 |
| Table 11.18: Construction Vibration Results                                                             | 20 |
| Table 11.19: Exposure Levels - 2025 baseline                                                            | 22 |
| Table 11.20: Exposure Levels - 2030 no build scenario                                                   | 24 |
| Table 11.21: Exposure Levels - 2040 no build scenario                                                   | 25 |
| Table 11.22: Exposure Levels - 2050 no build scenario                                                   | 27 |
| Table 11.23: Impact Assessment 2030                                                                     | 27 |
| Table 11.24: Impact Assessment 2040                                                                     | 27 |
| Table 11.25: Impact Assessment 2050                                                                     | 28 |
| Table 11.26: Buildings exposed to noise levels exceeding 60 dB $L_{night}$ with and without the Project | 29 |
| Table 11.27: Summary of Mitigation Measures                                                             | 31 |
| Table 11.28: Summary of residual effects for construction and operational phases                        | 33 |

## Figures

|                                                                                                            |    |
|------------------------------------------------------------------------------------------------------------|----|
| Figure 11.1: Aol for noise and vibration                                                                   | 4  |
| Figure 11.2: Construction noise calculation polygons                                                       | 9  |
| Figure 11.3: Baseline noise monitoring stations                                                            | 12 |
| Figure 11.4: Assessment points                                                                             | 13 |
| Figure 11.5: 2025 baseline operational noise – daytime- $L_{day}$                                          | 21 |
| Figure 11.6: 2025 baseline operational noise – night-time- $L_{night}$                                     | 22 |
| Figure 11.7: 2030 operational noise – no build scenario – daytime- $L_{day}$                               | 23 |
| Figure 11.8: 2030 operational noise – no build scenario – night-time- $L_{night}$                          | 23 |
| Figure 11.9: 2040 operational noise – no build scenario – daytime- $L_{day}$                               | 24 |
| Figure 11.10: 2040 operational noise – no build scenario – night-time- $L_{night}$                         | 25 |
| Figure 11.11: 2050 operational noise – no build scenario – daytime- $L_{day}$                              | 26 |
| Figure 11.12: 2050 operational noise – no build scenario – night-time- $L_{night}$                         | 26 |
| Figure 11.13: $L_{day}$ difference contours 2050 vs 2025 baseline                                          | 29 |
| Figure 11.14: Operational noise contours for areas exceeding 60 dB $L_{night}$ under the Project scenarios | 30 |
| Figure 11.15: Residual impacts of airport noise - 2030 (orange moderate, red major)                        | 34 |
| Figure 11.16: Residual impacts of airport noise – 2040 (orange moderate, red major)                        | 35 |
| Figure 11.17: Residual impacts of airport noise – 2050 (orange moderate, red major)                        | 36 |

# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                       |
|------------------------|--------------------------------------------------|
| AoI                    | Area of Influence                                |
| AP                     | Assessment Point                                 |
| APU                    | Auxiliary Power Unit                             |
| BAKAD                  | Big Almaty Ring Road                             |
| CDO                    | Continuous Descent Operations                    |
| CFA                    | Continuous Flight Auger                          |
| EBRD                   | European Bank for Reconstruction and Development |
| ECAC                   | European Civil Aviation Conference               |
| EHS                    | Environmental, Health, and Safety                |
| ESIA                   | Environmental and Social Impact Assessment       |
| EU                     | European Union                                   |
| GPU                    | Ground Power Unit                                |
| GSE                    | Ground Support Equipment                         |
| ICAO                   | International Civil Aviation Organization        |
| IFC                    | International Finance Corporation                |
| Lday                   | Daytime Equivalent Continuous Sound Level        |
| Lnight                 | Night-time Equivalent Continuous Sound Level     |
| LTO                    | Landing and Take-Off                             |
| PPV                    | Peak Particle Velocity                           |
| VdB                    | Vibration decibels                               |
| WHO                    | World Health Organization                        |

# 11 Noise

## 11.1 Introduction

- 11.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) reports the findings of an assessment of the likely significant environmental effects on noise and vibration as a result of the Project.
- 11.1.2 An assessment of likely significant effects has been undertaken for each of the sensitive receptors identified in the study area, with detailed results presented for 108 selected receptors. Where necessary, commitment to mitigation measures has been made to manage any impacts on receptors.
- 11.1.3 The Project is expected to result in temporary and permanent impacts including:
- Temporary noise and vibration impacts arising during construction activities
  - Permanent noise impacts due to aircraft associated with:
    - Auxiliary power unit (APU) use
    - Taxiing
    - Landing and take off
    - Flight paths
    - Ground support equipment (GSE)
  - Permanent changes in road traffic noise associated with increased patronage of the airport once the Project is implemented
  - Temporary changes in road traffic noise associated with the transfer of materials during construction
- 11.1.4 The airport lies adjacent to the communities of Guldala, Tbilisskaya, Imeni, Al'merek and Turksib comprising sensitive receptors such as residential properties, educational establishments, places of worship and healthcare facilities, which are considered sensitive to noise and vibration.
- 11.1.5 Therefore, there is potential for noise and vibration impacts due to the Project to result in adverse effects such as annoyance, sleep disturbance and disruption to communication, which are defined by the World Health Organization (WHO) as critical health effects<sup>1</sup>. Consequently, it is important that potential significant adverse effects are identified so that measures to avoid them can be considered and residual significant adverse effects can be reduced to a minimum.
- 11.1.6 The detailed noise impact assessment is presented in the Environmental Noise & Vibration Assessment Report produced by Frekans (2025)<sup>2</sup>. This section presents a summary of the assessment findings as applied within the methodology the ESIA.

## 11.2 Methodology

- 11.2.1 To undertake the ESIA, the methodology described in section 4.7 of **ESIA Chapter 4: ESIA scope and methodology** was followed. A bespoke methodology for the assessment of noise and vibration impacts is described in the sections below.

---

<sup>1</sup> World Health Organization (1999). Guidelines for Community Noise.

<sup>2</sup> Frekans (2025). Almaty International Airport – Environmental Noise & Vibration Assessment Report. 12 September 2025.



## Applicable guidelines and standards

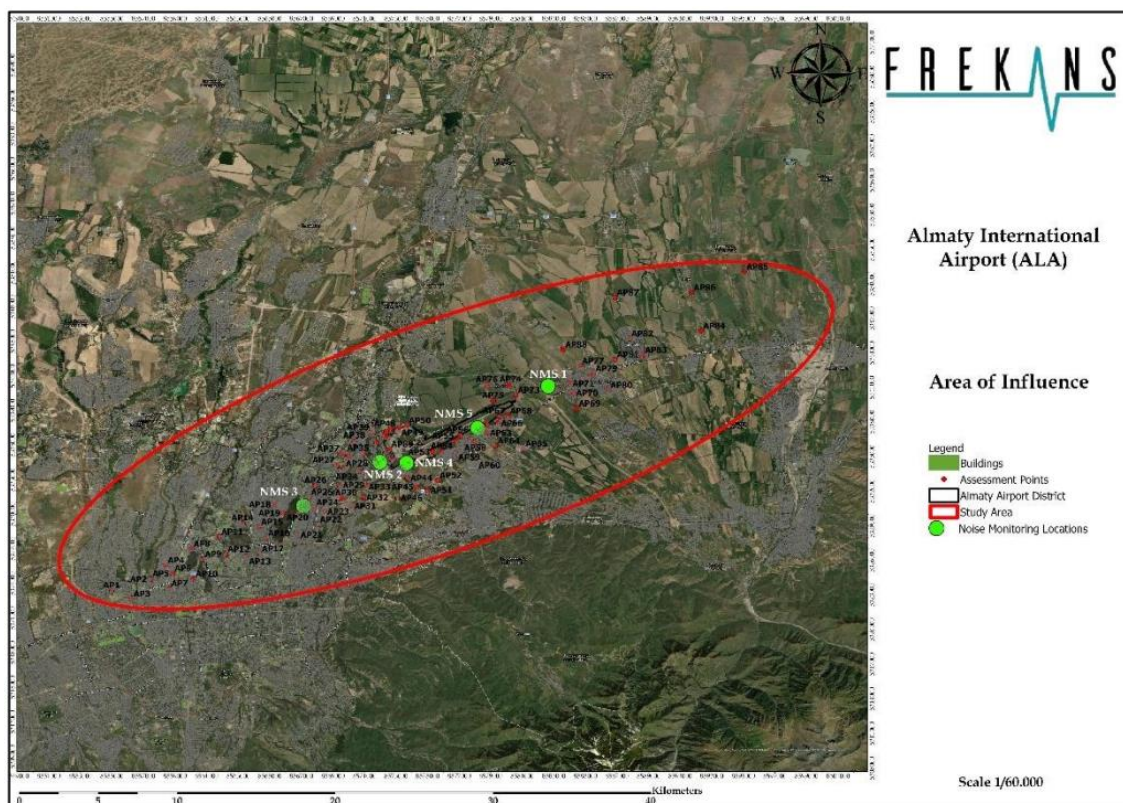
11.2.2 The assessment has been undertaken considering relevant legislation, standards, and guidance as follows:

- International Finance Corporation (IFC) (2007) Environmental, Health, and Safety (EHS) Guidelines: General Guidelines
- IFC (2007) EHS Guidelines: Airports
- IFC (2007) General EHS Guidelines: Construction and Decommissioning
- National Noise Standards of the Republic of Kazakhstan
  - MSN 2.04-03-2005: Noise protection standards
  - SNiP RK 2.04-03-2002: Construction norms and rules for noise protection
  - GOST 23337-2014: Noise limitations for construction activities
- WHO (1999) 'Guidelines for Community Noise'
- WHO (2018) Environmental Noise Guidelines for the European Region
- International Civil Aviation Organization (ICAO) (2008) Document 9829 Guidance on the Balanced Approach to Aircraft Noise Management, Second edition. 2008
- British Standards Institution (2009+A1:2014) British Standard BS 5228 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration'
- British Standards Institution (1993) British Standard BS 7385 Evaluation and measurement for vibration in buildings - Guide to damage levels from groundborne vibration
- European Union (2014) Regulation (EU) No. 598/2014 of the European Parliament and of the Council of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC
- European Civil Aviation Conference (ECAC) (2016) Document 29 Report on Standard Method of Computing Noise Contours around Civil Airports

## Area of Influence for noise and vibration

11.2.3 The Area of Influence (AoI) for noise and vibration impacts due to the Project, for the purpose of identifying potential significant adverse effects, includes all areas where the noise criteria, as set out below, are predicted to be exceeded as a result of the Project. Figure 11.1 shows the AoI for the Project.

**Figure 11.1: Aol for noise and vibration**



Source: Frekans Acoustics

## Methodological approach

11.2.4 This section of the ESIA chapter presents the methodology applied to the assessment of impacts.

11.2.5 The national noise standards of the Republic of Kazakhstan are presented in Table 11.1 and are applied to:

- Areas directly adjacent to residential buildings, recreational facilities and homes for the elderly
- Areas directly adjacent to the buildings of polyclinics (doctors' surgeries), schools and other educational institutions, kindergartens, recreation areas of residential districts, and groups of residential buildings.

**Table 11.1: National noise standards of the Republic of Kazakhstan**

| Time           | Average compound frequencies of octave bands (Hz) |     |     |     |       |       |       |       | Noise level dB   |                     |
|----------------|---------------------------------------------------|-----|-----|-----|-------|-------|-------|-------|------------------|---------------------|
|                | 63                                                | 125 | 250 | 500 | 1,000 | 2,000 | 4,000 | 8,000 | L <sub>Aeq</sub> | L <sub>A(max)</sub> |
| 07:00 to 23:00 | 75                                                | 66  | 59  | 54  | 50    | 47    | 45    | 44    | 55               | 70                  |
| 23:00 to 07:00 | 67                                                | 57  | 49  | 44  | 40    | 37    | 35    | 33    | 45               | 60                  |

Source: National noise standards of the Republic of Kazakhstan

11.2.6 The European Bank for Reconstruction and Development (EBRD) Environmental and Social Policy considers noise and vibration as forms of pollution with performance requirements described by the EBRD Environmental and Social Requirements. This requires that projects comply with European Union standards.

- 11.2.7 The IFC / World Bank Group General Performance Standards are commonly used by international lenders and apply in non-designated countries under the Equator Principles. The compliance of a project's environment impacts with the Performance Standards is assessed in accordance with the IFC and World Bank Group EHS Guidelines.
- 11.2.8 WHO (1999) 'Guidelines for Community Noise' provides the basis of the criteria used or referenced within standards, guidance and assessment methodologies underpinning government policy and guidance internationally. The guidelines are intended to inform the long-term management of community noise to help meet the WHO's core objective of "the attainment by all peoples of the highest possible levels of health". The key guideline values are:
- Critical health effect of serious annoyance during the daytime and evening corresponds with the guideline value of 55 dB  $L_{Aeq}$  in outdoor living areas
  - Critical health effect of sleep disturbance during the night-time corresponds with the guideline value of 45 dB  $L_{Aeq}$  in outside bedrooms
  - Critical health effect of hearing impairment at any time of day corresponds with the guideline value of 70 dB  $L_{Aeq}$  in industrial, commercial, shopping and traffic areas both indoors and outdoors
- 11.2.9 The IFC General EHS Guidelines: Environmental 'Noise management' refer to the WHO guidelines and state that noise impacts should not exceed the levels presented in Table 11.2, or result in a maximum increase in background levels of 3 dB at the nearest receptor location.

**Table 11.2: WBG-IFC Noise level guidelines**

| Receptor                                | $L_{Aeq,1h}$ dB Daytime 07:00 to 22:00* | $L_{Aeq,1h}$ dB Night-time 22:00 to 07:00* |
|-----------------------------------------|-----------------------------------------|--------------------------------------------|
| Residential, institutional, educational | 55                                      | 45                                         |
| Industrial, commercial                  | 70                                      | 70                                         |

Source: Section 1.7 Noise of the IFC / World Bank Group General EHS Environmental Guidelines

\* For Almaty International Airport, the locally established regulatory time periods are 09:00-22:00 (day-time) and 22:00-09:00 (night-time). All  $L_{day}$  and  $L_{night}$  calculations are performed using these local regulatory time periods.

- 11.2.10 The IFC Environmental, Health, and Safety Guidelines: Airports (2007) and the 'Construction and Decommissioning' section of the IFC General EHS Guidelines identify the main types of noise and vibration impacts and typical mitigation measures. They do not present methodologies or criteria for the assessment of noise and vibration impacts that are additional to those of the General Guidelines.
- 11.2.11 Regulation (EU) No 598/201477 requires the management of airport operational noise impacts in a sustainable way by the achievement of defined noise abatement objectives, efficient operation and avoiding creating competitive advantages or disadvantages. It applies to (Member State) airports with more than 50,000 civil aircraft movements per calendar year. Values referencing the Lender's advisory traffic and technical due diligence report indicate that this threshold is already exceeded by the airport.
- 11.2.12 Reference is made to Resolution A33/7 of the ICAO concept of the 'Balanced Approach' as a basis of sustainable noise management of airports. The measures of the 'Balanced Approach' should be applied in achieving the noise abatement objectives, and noise-related operating restrictions should only be applied where these are found not to be sufficient.
- 11.2.13 The Regulation requires that the noise impacts are regularly assessed including the cost effectiveness of any mitigation measures. Annex I of the Regulations outlines the approach to the assessment of operational aircraft noise associated with airports.

- 11.2.14 The British Standard BS 5228 (2009+A1:2014) 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration' provides a methodology to predict and assess temporary noise and vibration impacts arising during construction. The 'Example method 2 – 5 dB(A) change' states:

*"Noise levels generated by site activities are deemed to be potentially significant if the total noise (preconstruction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB LAeq,T from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect."*

- 11.2.15 BS 5228 provides comprehensive guidance on the assessment of vibration due to construction activity. It considers levels of vibration from construction in terms of peak particle velocity (PPV) defined as the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position and is expressed in millimetres per second (mm/s). BS 5228 provides guidance on the levels of vibration associated with human perception and disturbance and the onset of potential structural damage to different types of buildings.

- 11.2.16 Table 11.3 presents guidance on threshold values for the human perception of vibration arising during construction.

**Table 11.3: BS 5228 Part 2 guidance on the human perception effects of vibration due to construction activity and significance of effect**

| Vibration level PPV mm/s | Effect                                                                                                                                                                                 |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.14                     | Vibration might be perceptible in most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration. |
| 0.3                      | Vibration might be just perceptible in residential environments.                                                                                                                       |
| 1.0                      | It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning has been given to the residents.                      |
| 10.0                     | Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.                                                             |

Source: BS 5228 Part 2:2009+A1:2014

- 11.2.17 BS 5228 Part 2:2009+A1:2014 states that low frequency vibration at a PPV of 15mm/s may cause cosmetic damage in un-reinforced or light framed structures e.g. for residential / light commercial use. BS 5228 states that vibration at a PPV of 50mm/s may cause cosmetic damage in heavy commercial buildings. These values apply to transient vibration which does not induce a resonant response in structures and low-rise buildings. A source of continuous low frequency vibration may induce a vibration response in buildings or structures at their resonant frequencies. The building would then be subject to additional dynamic forces arising from its own motion. Therefore, BS 5228 Part 2:2009+A1:2014 recommends that the values given should be reduced by 50% to take into account dynamic magnification due to resonances. Therefore, Table 11.4 summarises the criteria for assessing ground-borne vibration during construction activity in terms of potential cosmetic damage of buildings.

**Table 11.4: BS 5228 Part 2 guidance on the human perception effects of vibration due to construction activity and significance of effect**

| Vibration level PPV mm/s | Effect                                                                                                           |
|--------------------------|------------------------------------------------------------------------------------------------------------------|
| 0.14                     | Low risk of cosmetic damage to un-reinforced or light framed structures / buildings (e.g. residential buildings) |
| 0.3                      | Vibration might just be perceptible to building occupants in residential environments                            |

| Vibration level PPV mm/s            | Effect                                                                                 |
|-------------------------------------|----------------------------------------------------------------------------------------|
| 15.0 to 20.0                        | Onset of increased risk of cosmetic damage to unreinforced or light framed structures. |
| Source: BS 5228 Part 2:2009+A1:2014 |                                                                                        |

11.2.18 The selected assessment criteria are summarised in Table 11.5.

**Table 11.5: Comparison of noise and vibration limits and selected criteria**

| Receptor type             | WHO                        | IFC EHS                   | Kazakhstan national      | Assessment criteria applied |
|---------------------------|----------------------------|---------------------------|--------------------------|-----------------------------|
| <b>Operational noise</b>  |                            |                           |                          |                             |
| Residential (day)         | 55 dB L <sub>Aeq,16h</sub> | 55 dB L <sub>Aeq,1h</sub> | 55 dB(A)                 | 55 dB(A)                    |
| Residential night         | 45 dB L <sub>Aeq,8h</sub>  | 45 dB L <sub>Aeq,1h</sub> | 45 dB(A)                 | 45 dB(A)                    |
| Schools                   | -                          | -                         | 55 dB L <sub>day</sub>   | 55 dB L <sub>day</sub>      |
| Hospitals                 | -                          | -                         | 45 dB L <sub>night</sub> | 45 dB L <sub>night</sub>    |
| Commercial/industrial     | -                          | 70 dB L <sub>Aeq,1h</sub> | -                        | 70 dB(A)                    |
| <b>Construction noise</b> |                            |                           |                          |                             |
| Construction (day)        | 55 dB L <sub>Aeq,16h</sub> | 55 dB L <sub>Aeq,1h</sub> | -                        | 55 dB(A)                    |
| <b>Vibration limits</b>   |                            |                           |                          |                             |
| Residential (comfort)     | -                          | -                         | -                        | 0.3 mm/s (BS 5228-2)        |
| Residential (damage)      | -                          | -                         | -                        | 15 to 20 mm/s (BS 5228-2)   |

## Determining Magnitude, Sensitivity, and Impact Significance

11.2.19 The responsivity of the receptor is evaluated on the basis of the importance and the sensitivity of receptor to the impact. The responsivity is selected in accordance with the following matrix.

**Table 11.6: Determination of Responsivity of Receptors**

| Importance | Sensitivity |        |        |        |
|------------|-------------|--------|--------|--------|
|            | Negligible  | Low    | Medium | High   |
| Low        | Low         | Low    | Low    | Medium |
| Medium     | Low         | Low    | Medium | High   |
| High       | Medium      | Medium | High   | High   |

11.2.19.1 The sensitivity of receptors is aligned with the ESIA methodology as described in **ESIA Chapter 4: ESIA scope and methodology** except that no receptors are assigned 'Negligible' sensitivity.

11.2.19.2 The importance is determined by the criteria given in Table 11.7.

**Table 11.7: Determination of Importance of Receptors**

| Importance | Key criteria                                                                                                                                      | Receptors                                                 |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| High       | Legally protected or nationally designated<br>Strong stakeholder concern<br>High sensitivity or vulnerability<br>Critical public service function | Hospitals<br>Educational buildings<br>Religious buildings |
| Medium     | Regionally important but not legally protected<br>Moderate sensitivity<br>Residential use                                                         | Residential buildings                                     |

| Importance | Key criteria                                                                  | Receptors                                           |
|------------|-------------------------------------------------------------------------------|-----------------------------------------------------|
| Low        | No formal protection<br>Low sensitivity<br>Limited or local economic function | Commercial buildings<br>Workplaces<br>Barns/stables |

11.2.20 The magnitude of impacts is determined from a combination of the extent and the scale of impact, as shown in the matrix on Table 11.8. where extent is defined as:

- Single: possible noise and/or vibration impact on a single building
- Site: possible noise and/or vibration impact on 5 to 10 buildings
- Local: possible noise and/or vibration impact on 10 to 100 buildings
- Regional: possible noise and/or vibration impact on 100 to 1,000 buildings

**Table 11.8: Determination of Impact Magnitude**

| Extent   | Scale      |          |          |          |            |
|----------|------------|----------|----------|----------|------------|
|          | No Impact  | Small    | Medium   | Large    | Very Large |
| Single   | Negligible | Minor    | Minor    | Minor    | Minor      |
| Site     | Negligible | Minor    | Moderate | Moderate | Major      |
| Local    | Negligible | Moderate | Moderate | Major    | Major      |
| Regional | Negligible | Moderate | Major    | Major    | Major      |

11.2.21 The scale of noise impact is the measure of how much noise exceeds limiting values at receptor locations. It is evaluated as the exceedance level with respect to the background noise levels. This assessment uses mainly  $L_{day}$  and  $L_{night}$ .

11.2.22 The criteria to determine the magnitude of noise impact during construction and operation are detailed in Table 11.9.

**Table 11.9: Scale of Magnitude of Noise Impact**

| Noise impact scale category | Exceedance of noise limits<br>WBG - IFC Criteria |
|-----------------------------|--------------------------------------------------|
| No Impact                   | <1                                               |
| Small                       | 1 to 3                                           |
| Medium                      | 3 to 5                                           |
| Large                       | 5 to 8                                           |
| Very Large                  | >8                                               |

11.2.23 Based on the guidance given in BS 5228 Part 2:2009+A1:2014, Table 11.10 presents the criteria for assessing the magnitude of temporary construction vibration impacts on sensitive receptors.

**Table 11.10: Scale of Magnitude of Construction Vibration Impact**

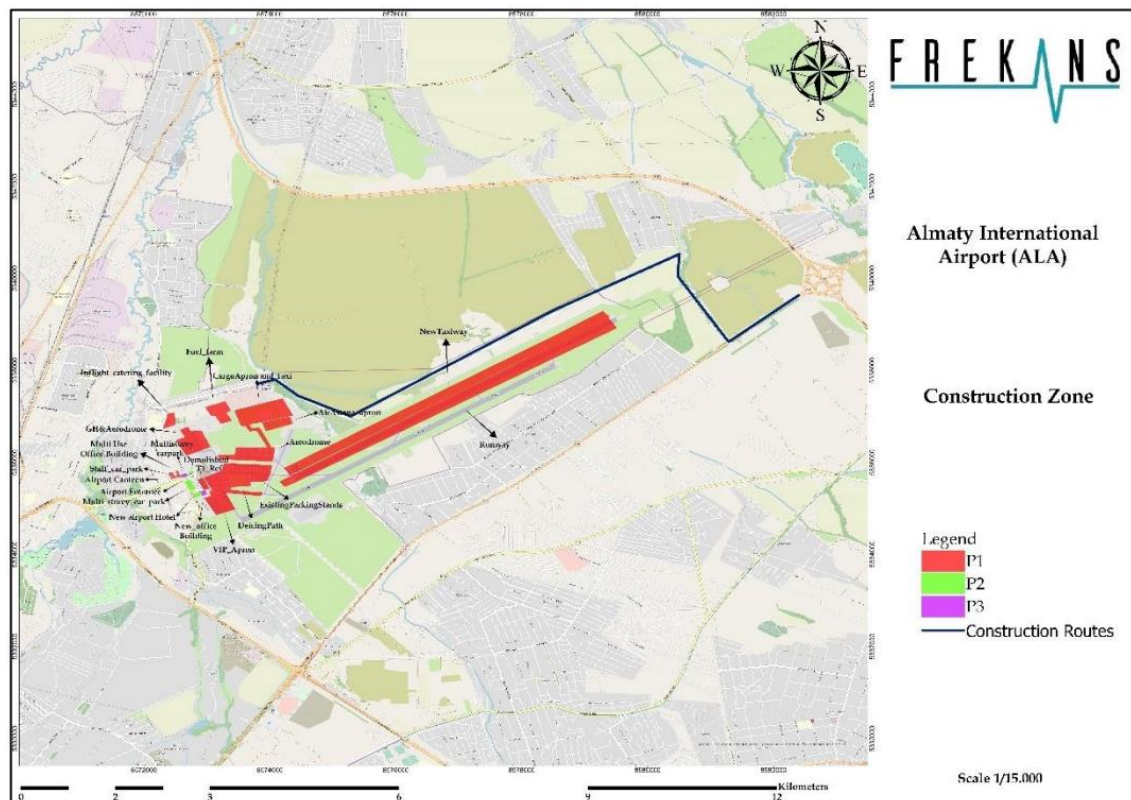
| Vibration level PPV<br>mm/s | Category of construction vibration impact<br>scale |
|-----------------------------|----------------------------------------------------|
| <0.14                       | No Impact                                          |
| <0.3                        | Small                                              |
| <1                          | Medium                                             |
| <10                         | Large                                              |
| >10                         | Very Large                                         |



## Limitations and assumptions

- 11.2.24 Construction noise predictions have been undertaken using guidance and methodology from BS 5228-1:2009+A1:2014.
- 11.2.25 The construction is divided on three phases:
- Phase 1 – Critical Infrastructure (2025 to 2027)
  - Phase 2 - Operational Enhancement (2026 to 2028)
  - Phase 3 – Supporting Infrastructure (2027 to 2030)
- 11.2.26 The construction areas are divided into areas, defined as 'polygons', as shown in Figure 6-1 of the Environmental Noise & Vibration Assessment Report<sup>2</sup> prepared by Frekans Acoustics (see Figure 11.2 below).

**Figure 11.2: Construction noise calculation polygons**



Source: Frekans Acoustics

- 11.2.27 The general information on construction activities and plant are presented Table 11.11 below, which describes the main items of construction plant to be used during each phase of work and the corresponding reference sound power level ( $L_w$ ), corrected from the sound pressure levels presented in BS 5228-1, and used in the noise predictions.

**Table 11.11: Summary of methodology for the identification of significant effects**

| Activity                      | Plant                  | BS 5228 reference             | $L_w$ dB(A) |
|-------------------------------|------------------------|-------------------------------|-------------|
| Site preparation & earthworks | Tracked excavator      | BS 5228-1: Table C.1, Item 12 | 110         |
|                               | Articulated dump truck | BS 5228-1: Table C.2, Item 33 | 109         |
|                               | Vibratory roller       | BS 5228-1: Table C.2, Item 39 | 102         |

| Activity                   | Plant                                   | BS 5228 reference             | L <sub>w</sub> dB(A) |
|----------------------------|-----------------------------------------|-------------------------------|----------------------|
| Foundation & piling works  | Water pump                              | BS 5228-1: Table C.2, Item 45 | 93                   |
|                            | Tracked excavator                       | BS 5228-1: Table C.1, Item 12 | 110                  |
|                            | Concrete mixer truck                    | BS 5228-1: Table C.4, Item 20 | 108                  |
|                            | Tubular steel piling – hydraulic hammer | BS 5228-1: Table C.3, Item 3  | 116                  |
| Structural condition       | Water pump                              | BS 5228-1: Table C.2, Item 45 | 93                   |
|                            | Wheeled mobile crane                    | BS 5228-1: Table C.3, Item 30 | 98                   |
|                            | Concrete mixer truck                    | BS 5228-1: Table C.4, Item 20 | 108                  |
| External works & utilities | Water pump                              | BS 5228-1: Table C.2, Item 45 | 93                   |
|                            | Tracked excavator                       | BS 5228-1: Table C.1, Item 12 | 110                  |
|                            | Grader                                  | BS 5228-1: Table C.6, Item 31 | 114                  |
|                            | Vibratory roller                        | BS 5228-1: Table C.2, Item 39 | 102                  |
|                            | Articulated dump truck                  | BS 5228-1: Table C.2, Item 33 | 109                  |

- 11.2.28 A more detailed list of equipment used in the assessment is provided in the Environmental Noise & Vibration Assessment Report<sup>2</sup>.
- 11.2.29 For the noise modelling, the equipment is assumed to be working in the construction polygon simultaneously and at full performance.
- 11.2.30 The construction vibration analysis focuses on pile driving activities, which typically generate the highest vibration levels during airport construction projects. Calculations were conducted according to the information and reference vibration levels gathered from guidance issued by the Federal Transit Administration. The reference values are presented in Table 11.12.

**Table 11.12: Reference Vibration Levels of Construction Equipment**

| Equipment                      |             | PPV at 25 ft (in/sec) | Approximate L <sub>v</sub> at 25 ft = 7.6 m |
|--------------------------------|-------------|-----------------------|---------------------------------------------|
| Pile driver (impact)           | upper range | 1.518                 | 112                                         |
|                                | typical     | 0.644                 | 104                                         |
| Pile driver (sonic)            | upper range | 0.734                 | 105                                         |
|                                | typical     | 0.170                 | 93                                          |
| Clam shovel drop (slurry wall) |             | 0.202                 | 94                                          |
| Hydromil (slurry wall)         | in soil     | 0.008                 | 66                                          |
|                                | in rock     | 0.017                 | 75                                          |
| Vibratory                      |             | 0.210                 | 94                                          |
| Hoe ram                        |             | 0.089                 | 87                                          |
| Excavator                      |             | 0.089                 | 87                                          |
| Caisson drilling               |             | 0.089                 | 87                                          |
| Loaded trucks                  |             | 0.076                 | 86                                          |
| Jackhammer                     |             | 0.035                 | 79                                          |
| Small bulldozer                |             | 0.003                 | 58                                          |

RMS velocity in decibels (VdB RE 1 micro-inch/second)

- 11.2.31 The reference value for impact pile driver and excavator were used in the assessment of vibration.
- 11.2.32 No piling activities were reported for the multi-use office building construction.
- 11.2.33 Calculations and assessment procedures of construction noise and vibration are accurate in line with the accuracy and detail level of the provided information and Project documents.



- 11.2.34 The operational noise assessment encompasses the following components:
- Aircraft operations (Landing and Take-off (LTO) cycles)
  - Ground Support Operations
- 11.2.35 The daytime and night-time impacts of the air traffic movements are considered under the current runway configuration (2025) and the future runway configuration based on air traffic estimations for the years 2030, 2040 and 2050.
- 11.2.36 The air traffic movements considered in the assessment are summarised in Table 11.13. The table also summarises the assumptions in terms of fleet composition.

**Table 11.13: Air Traffic Assumptions**

| Assessment year | Daily aircraft movements | Fleet                                                                         |
|-----------------|--------------------------|-------------------------------------------------------------------------------|
| 2025 - Baseline | 272                      | 95.3% Chapter 4 aircraft<br>4.7% Chapter 3 aircraft                           |
| 2030            | 351                      | 95.3% Chapter 4 aircraft<br>4.7% Chapter 3 aircraft                           |
| 2040            | 473                      | 90% Chapter 4 aircraft<br>0.5% Chapter 3 aircraft<br>9.5% Chapter 14 aircraft |
| 2050            | 577                      | 70% Chapter 4 aircraft<br>30% Chapter 14 aircraft                             |

- 11.2.37 The ground operations modelling includes APU usage and GSE operations. The APU are modelled as stationary point sources with sound power levels 105 to 115 dB(A) depending on aircraft type and an operating height of 6 to 8 metres above ground level.
- 11.2.38 The GSE operations are modelled as area sources. Table 11.14 summarises the noise modelling assumptions.

**Table 11.14: Ground Support Equipment**

| Equipment type     | Sound Power Level (dBA) | Usage factor |
|--------------------|-------------------------|--------------|
| Baggage loaders    | 98 to 105               | 0.3          |
| Catering trucks    | 95 to 102               | 0.2          |
| Fuel trucks        | 100 to 108              | 0.15         |
| Aircraft tugs      | 96 to 103               | 0.25         |
| Ground power units | 105 to 112              | 0.4          |

- 11.2.39 Impact magnitude is assessed based on the predicted scale and extent of impact. This is used to determine the significance of resulting effects, taking into account receptor responsiveness which is a function of sensitivity and importance.

## 11.3 Baseline

### Current baseline

- 11.3.1 Generally, noise associated with aircraft movements is a significant feature of the environment surrounding airports, which may affect communities at relatively long distances from the airport. Consequently, the AoI may be quite large and depend on flight paths and operating regimes. Aircraft noise comprises intermittent noise events from LTO cycles and more steady noise from aircraft sources on the ground such as engines during taxiing and the APU. Furthermore, noise from road traffic accessing the airport can also elevate the general background noise. Localised sources such as the operation of building services plant and GSE may also contribute.

- 11.3.2 Baseline noise measurements were obtained by Frekans Acoustics<sup>2</sup> (August 2025) using the outputs of the five noise-monitoring stations located within the surrounding area and the results are presented within the Environmental Noise & Vibration Assessment Report<sup>2</sup>.
- 11.3.3 The locations of the five noise-monitoring stations are shown in Figure 5-2 of the Frekans Acoustics report<sup>2</sup> and are reproduced in Figure 11.3 below. The results of the measurements are compiled and presented in the Quarterly Noise Measurement Report. These are summarised in Table 11.15.

**Figure 11.3: Baseline noise monitoring stations**



Source: Frekans Acoustics

- 11.3.4 The values are based on the time intervals defined for  $L_{day}$  and  $L_{night}$  in the WBG Noise guidelines (07:00 to 22:00 and 22:00 to 07:00, respectively), as well as the local assessment criteria of Kazakhstan, which define  $L_{day}$  as 09:00 to 22:00 and  $L_{night}$  as 22:00 to 09:00.

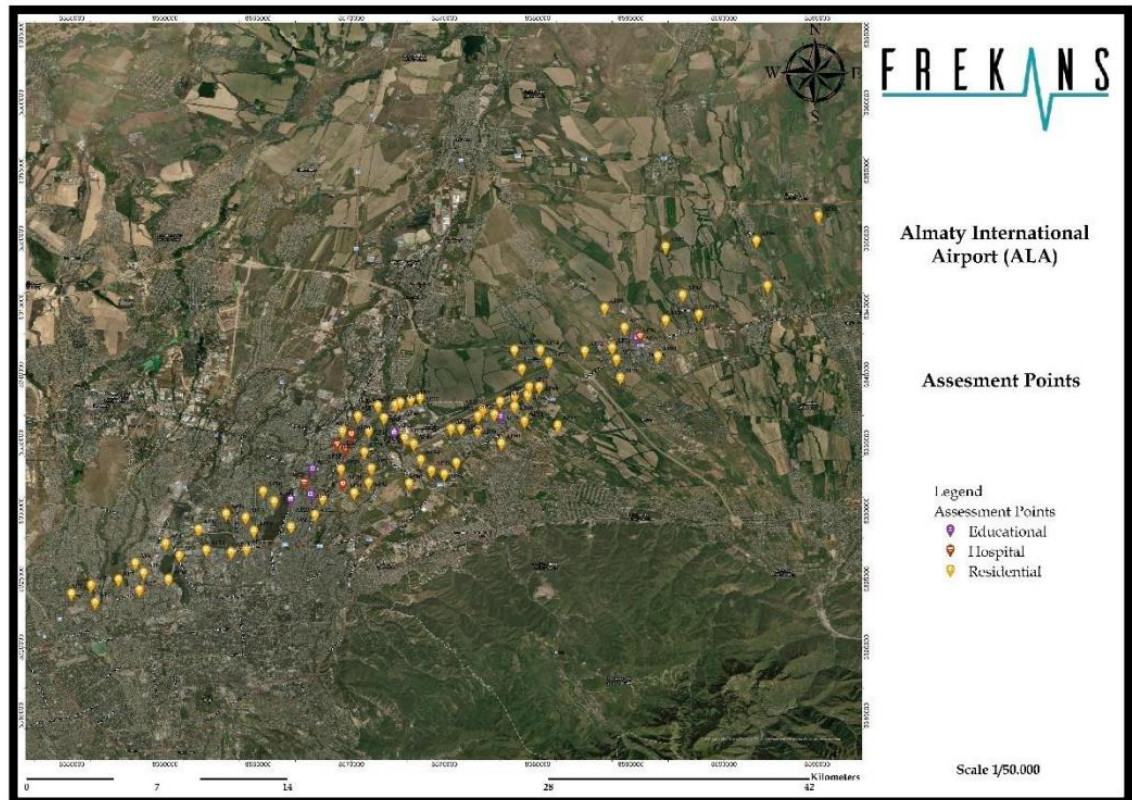
**Table 11.15: Summary of the baseline noise monitoring results (January to July 2025)**

| Monitoring location | $L_{dn}$ dB(A), WBG              |                                    | $L_{dn}$ dB(A), Local            |                                    |
|---------------------|----------------------------------|------------------------------------|----------------------------------|------------------------------------|
|                     | $L_{day}$ dB(A)<br>(07:00-22:00) | $L_{night}$ dB(A)<br>(22:00-07:00) | $L_{day}$ dB(A)<br>(09:00-22:00) | $L_{night}$ dB(A)<br>(22:00-09:00) |
| NMS 1               | 64.8                             | 61.8                               | 65.0                             | 62.3                               |
| NMS 2               | 59.8                             | 58.6                               | 59.9                             | 58.7                               |
| NMS 3               | 62.9                             | 63.9                               | 62.6                             | 64.0                               |
| NMS 4               | 73.6                             | 72.7                               | 73.6                             | 72.9                               |
| NMS 5               | 70.6                             | 70.3                               | 70.4                             | 70.6                               |

11.3.5 The Frekans Acoustics report<sup>2</sup> identifies 108 assessment points (AP) considered to be representative of the receptors potentially impacted within the AoI. Figure 11.4 shows the location of these APs. The APs include:

- 96 residential locations
- 7 hospitals
- 5 educational establishments

**Figure 11.4: Assessment points**



Source: Frekans Acoustics

11.3.6 The details of the APs are given in Table 11.16.

**Table 11.16: Assessment points**

| Assessment Points | Location       | Use         | Extent | Sensitivity | Importance |
|-------------------|----------------|-------------|--------|-------------|------------|
| AP 1              | Turksib/Almaty | Residential | Local  | High        | Medium     |
| AP 2              | Turksib/Almaty | Residential | Local  | High        | Medium     |
| AP 3              | Turksib/Almaty | Residential | Local  | High        | Medium     |
| AP 4              | Turksib/Almaty | Residential | Local  | High        | Medium     |
| AP 5              | Turksib/Almaty | Residential | Local  | High        | Medium     |
| AP 6              | Turksib/Almaty | Residential | Local  | High        | Medium     |
| AP 7              | Turksib/Almaty | Residential | Local  | High        | Medium     |
| AP 8              | Turksib/Almaty | Residential | Local  | High        | Medium     |
| AP 9              | Turksib/Almaty | Residential | Local  | High        | Medium     |
| AP 10             | Turksib/Almaty | Residential | Local  | High        | Medium     |

| Assessment Points | Location                    | Use         | Extent | Sensitivity | Importance |
|-------------------|-----------------------------|-------------|--------|-------------|------------|
| AP 11             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 12             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 13             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 14             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 15             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 16             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 17             | Turksib/Almaty              | Hospital    | Site   | High        | High       |
| AP 18             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 19             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 20             | Turksib/Almaty              | Educational | Site   | High        | High       |
| AP 21             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 22             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 23             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 24             | Turksib/Almaty              | Educational | Site   | High        | High       |
| AP 25             | Turksib/Almaty              | Hospital    | Site   | High        | High       |
| AP 26             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 27             | Turksib/Almaty              | Hospital    | Site   | High        | High       |
| AP 28             | Turksib/Almaty              | Educational | Site   | High        | High       |
| AP 29             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 30             | Turksib/Almaty              | Hospital    | Site   | High        | High       |
| AP 31             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 32             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 33             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 34             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 35             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 36             | Turksib/Almaty              | Hospital    | Site   | High        | High       |
| AP 37             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 38             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 39             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 40             | Turksib/Almaty Near Airport | Residential | Local  | High        | Medium     |
| AP 41             | Turksib/Almaty Near Airport | Educational | Site   | High        | High       |
| AP 42             | Turksib/Almaty Near Airport | Residential | Local  | High        | Medium     |
| AP 43             | Turksib/Almaty Near Airport | Residential | Local  | High        | Medium     |
| AP 44             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 45             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 46             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 47             | Turksib/Almaty Near Airport | Residential | Local  | High        | Medium     |
| AP 48             | Turksib/Almaty Near Airport | Residential | Local  | High        | Medium     |

| Assessment Points | Location                    | Use         | Extent | Sensitivity | Importance |
|-------------------|-----------------------------|-------------|--------|-------------|------------|
| AP 49             | Turksib/Almaty Near Airport | Residential | Local  | High        | Medium     |
| AP 50             | Turksib/Almaty Near Airport | Residential | Local  | High        | Medium     |
| AP 51             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 52             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 53             | Guldala Near Airport        | Residential | Local  | High        | Medium     |
| AP 54             | Guldala Near Airport        | Residential | Local  | High        | Medium     |
| AP 55             | Guldala Near Airport        | Residential | Local  | High        | Medium     |
| AP 56             | Guldala Near Airport        | Residential | Local  | High        | Medium     |
| AP 57             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 58             | Guldala                     | Educational | Site   | High        | High       |
| AP 59             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 60             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 61             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 62             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 63             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 64             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 65             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 66             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 67             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 68             | Guldala                     | Residential | Local  | High        | Medium     |
| AP 69             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 70             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 71             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 72             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 73             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 74             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 75             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 76             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 77             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 78             | Almerek                     | Educational | Site   | High        | High       |
| AP 79             | Almerek                     | Hospital    | Site   | High        | High       |
| AP 80             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 81             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 82             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 83             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 84             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 85             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 86             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 87             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 88             | Almerek                     | Residential | Local  | High        | Medium     |



| Assessment Points | Location                    | Use         | Extent | Sensitivity | Importance |
|-------------------|-----------------------------|-------------|--------|-------------|------------|
| AP 89             | Turksib/Almaty Near Airport | Residential | Site   | High        | Medium     |
| AP 90             | Turksib/Almaty Near Airport | Residential | Site   | High        | Medium     |
| AP91              | Turksib/Almaty Near Airport | Residential | Site   | High        | Medium     |
| AP 92             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 93             | Almerek                     | Residential | Local  | High        | Medium     |
| AP 94             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 95             | Turksib/Almaty              | Residential | Site   | High        | Medium     |
| AP 96             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 97             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 98             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 99             | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 100            | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 101            | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 102            | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 103            | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 104            | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 105            | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 106            | Turksib/Almaty              | Residential | Local  | High        | Medium     |
| AP 107            | Guldala                     | Residential | Local  | High        | Medium     |
| AP 108            | Guldala                     | Residential | Local  | High        | Medium     |

## Future baseline

11.3.7 The future baseline is considered as the 'No Build Scenario' for noise due to operational aircraft noise and GSE in the years 2030, 2040 and 2050.

## 11.4 Potential impacts

11.4.1 The potential construction phase effects are associated with:

- Noise and vibration impacts due to construction activities
- Road traffic noise impacts due to additional vehicle movements associated with construction

11.4.2 The potential operational phase effects are associated with:

- Airport noise:
  - Noise due to aircraft during APU use, taxiing, LTO cycles and using flight paths
  - Noise due to the use of GSE
- Road traffic noise due to vehicle movements associated with the patronage of the airport

## 11.5 Assessment of effects

### Construction phase effects

#### Construction activities – noise

- 11.5.1 The construction noise assessment has been undertaken considering four construction phases:
- Phase 1: New runway construction activities (concurrent with existing activities)
  - Phase 1+2: Combined runway and terminal expansion (with modified operational patterns)
  - Phase 2+3: Infrastructure modernisation with active operations (peak cumulative exposure period)
  - Phase 3: Final construction activities with full operational integration
- 11.5.2 The construction noise assessment represents the cumulative impact, including the 2025 baseline noise levels, derived from the operational noise maps.
- 11.5.3 The summary of impacts is provided in Table 11.17, which shows that a significant effect is only expected to arise at one receptor: AP89. This is expected to affect around 25 residents in 8 dwellings. The full results of the assessment at all points are presented in the Environmental Noise & Vibration Assessment Report<sup>2</sup>.

Table 11.17: Construction noise assessment results

| Const. Phase | Point | Use         | Distan | Sour  | Basel | Cu    | Lim.  | Lim.  | Magnitude Of Impact |        |          | Responsivity |       |       | Impact Significance | Mitigation                     |
|--------------|-------|-------------|--------|-------|-------|-------|-------|-------|---------------------|--------|----------|--------------|-------|-------|---------------------|--------------------------------|
|              |       |             | ce     | ce    | ine   | m.    | Val.  | Exc.  | Scale               | Extent | Imp. Mag | Imp.         | Sens. | Resp. |                     |                                |
|              |       |             | m      | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | Of Impact           |        |          |              |       |       |                     |                                |
| 1            | AP89  | Residential | 16     | 71.3  | 62.1  | 71.8  | 65.1  | +6.7  | Large               | Site   | Mod.     | Med.         | High  | High  | Major               | Precaution Design & Monitoring |
| 1+2          | AP89  | Residential | 16     | 71.4  | 62.1  | 71.9  | 65.1  | +6.8  | Large               | Site   | Mod.     | Med.         | High  | High  | Major               | Precaution Design & Monitoring |
| 2+3          | AP89  | Residential | 16     | 65.0  | 62.1  | 66.8  | 65.1  | +1.7  | Small               | Site   | Minor    | Med.         | High  | High  | Moderate            | Precaution Design & Monitoring |
| 3            | AP89  | Residential | 16     | 64.9  | 62.1  | 66.7  | 65.1  | +1.6  | Small               | Site   | Minor    | Medium       | High  | High  | Moderate            | Precaution Design & Monitoring |



11.5.4 Key findings of the construction noise assessment are:

- The majority of sensitive receptors experience no measurable impact as a result of construction noise.
- Receptors adjacent to the western boundary are predicted to be subject to minor to major noise effects.
- The highest cumulative noise levels (construction + current operational) will take place during Phase 1+2.
- The only identified exceedance of Kazakhstan's national construction noise limits (70 dBA  $L_{Aeq}$  daytime) is at AP89 during Phase 1 and Phase 1+2.

**Construction activities – vibration**

- 11.5.5 The construction vibration assessment focuses on pile-driving activities which are the most likely to generate high levels of vibration.
- 11.5.6 The assessment follows methodology from BS 5228-2:2009. Distance calculations indicate that construction activities within 22 metres of the receptors may result in significant vibration impacts.
- 11.5.7 Out of the 15 strategically selected receiver points representing the closest proximity to construction activities, all of the locations show vibration levels well below the threshold limit.
- 11.5.8 The point AP89, which is located 16 metres from the construction polygon P1\_Multi Use Office Building, is the most susceptible to significant vibration impacts due to the distance. However, no piling operations are planned for this area. The closest piling operation will be 55 metres from AP89. The PPV value is 0.078 mm/s, which is below the BS 5228-2:2009 limit value of 0.3 mm/s.
- 11.5.9 The summary of the construction vibration results for the selected points is presented in Table 11.18.

**Table 11.18: Construction Vibration Results**

| Point | Distance | Construction Polygon          | PPV    | BS 5228     | Magnitude of Impact |        |            | Responsivity |       |       | Impact Sig. |
|-------|----------|-------------------------------|--------|-------------|---------------------|--------|------------|--------------|-------|-------|-------------|
|       | M        |                               |        | Limit Value | Scale Of Impact     | Extent | Impact Mag | Imp.         | Sens. | Resp. |             |
|       |          |                               |        | mm/s        |                     |        |            |              |       |       |             |
| AP 40 | 540      | P1_inflight_catering_facility | 0.0025 | 0.3         | No impact           | Local  | Neg.       | Med.         | High  | High  | No impact   |
| AP 41 | 340      | P2_Multi_storey_car_park      | 0.0051 | 0.3         | No Impact           | Local  | Neg.       | High         | High  | High  | No Impact   |
| AP 42 | 215      | P1_VIP_Apron                  | 0.0101 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 43 | 420      | P1_VIP_Apron                  | 0.0037 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 47 | 90       | P1_inflight_catering_facility | 0.0373 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 48 | 240      | P1_inflight_catering_facility | 0.0086 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 49 | 185      | P1_Fuel_farm                  | 0.0126 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 50 | 330      | P1_CargoApron and Taxi        | 0.0053 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 56 | 280      | P1_Runway                     | 0.0068 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 61 | 280      | P1_Runway                     | 0.0068 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 62 | 350      | P1_Runway                     | 0.0049 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 67 | 260      | P1_Runway                     | 0.0076 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 75 | 450      | P1_NewTaxiway                 | 0.0033 | 0.3         | No Impact           | Local  | Neg.       | Med.         | High  | High  | No Impact   |
| AP 89 | 55       | P1_Multi Use Office Building  | 0.0780 | 0.3         | No Impact           | Site   | Neg.       | Med.         | Med.  | Med.  | Minor       |
| AP 90 | 45       | P1_inflight_catering_facility | 0.1054 | 0.3         | No Impact           | Site   | Neg.       | Med.         | Med.  | Med.  | No Impact   |
| AP 91 | 120      | P1_GH&Aerodrome               | 0.0242 | 0.3         | No Impact           | Site   | Neg.       | Med.         | Med.  | Med.  | No Impact   |

## Construction traffic – noise

11.5.10 Construction is expected to generate additional vehicle movements:

- Phase P1: 12 trucks per hour
- Phase P1 and P3: 6 trucks per hour

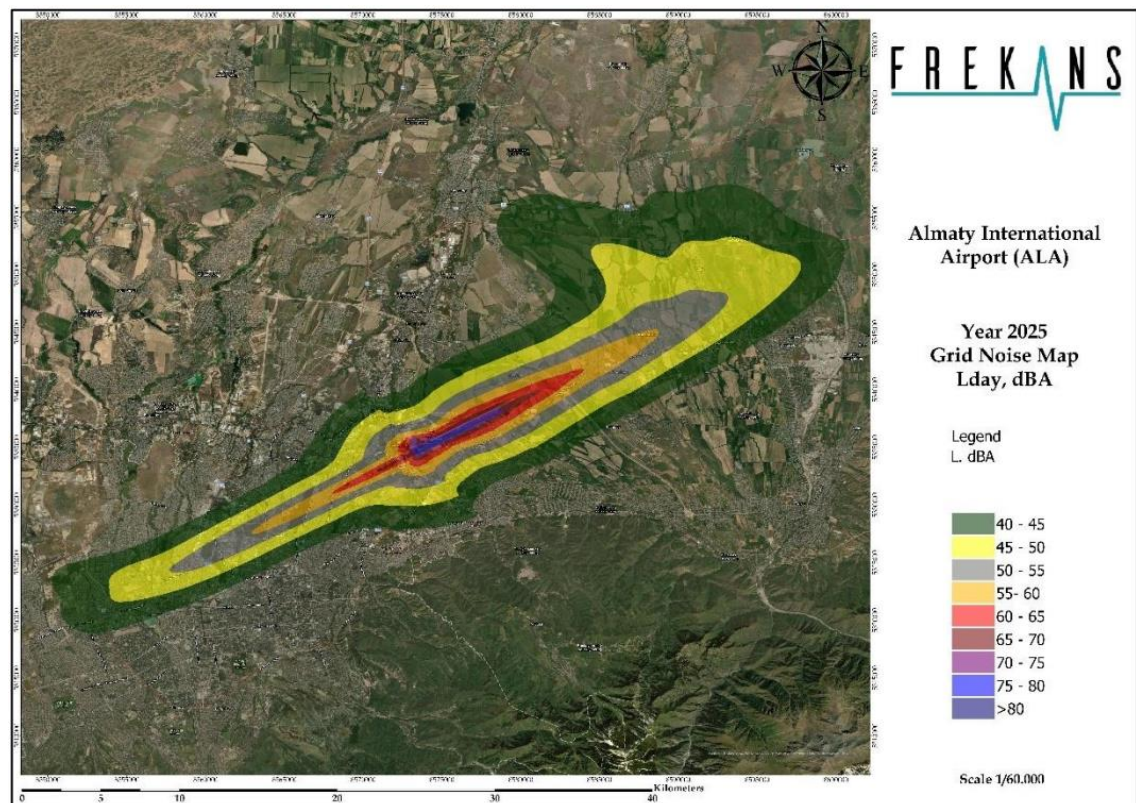
11.5.11 Figure 4-6 of the Environmental Noise & Vibration Assessment Report<sup>2</sup> indicates the construction traffic route accessing from the Big Almaty Ring Road (BAKAD) at the State Road 351, along the northern suburban connection road to Al'Merek and Uliksa Ahmetova Street into the airport at the north. The additional traffic results in a 0.7% increase in traffic volume on Uliksa Ahmetova Road and 0.4% increase on the A351. Corresponding increases in average road traffic noise from these roads would be negligible and not significant.

## Operational phase effects

### Airport noise

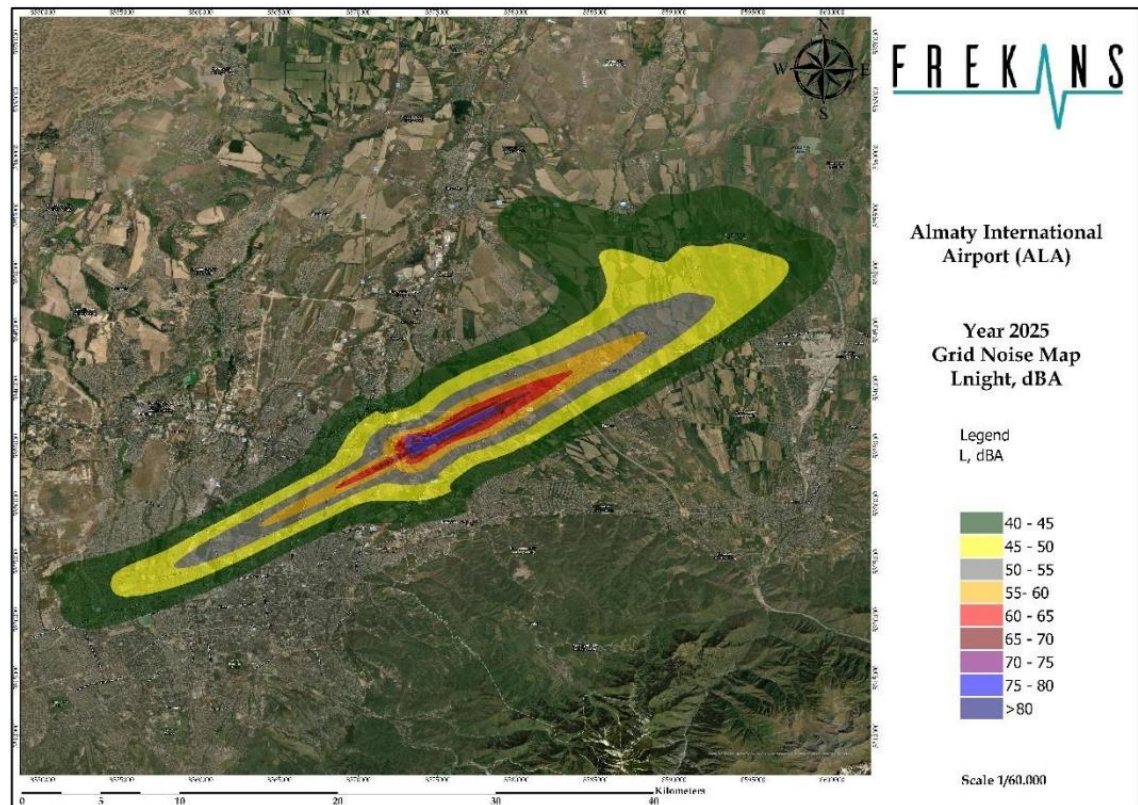
11.5.12 The summary of the current 2025 baseline noise contours as well as for the years 2030, 2040 and 2050 are shown in the following figures and tables.

**Figure 11.5: 2025 baseline operational noise – daytime  $L_{day}$**



Source: Frekans Acoustics

**Figure 11.6: 2025 baseline operational noise – night-time  $L_{night}$**



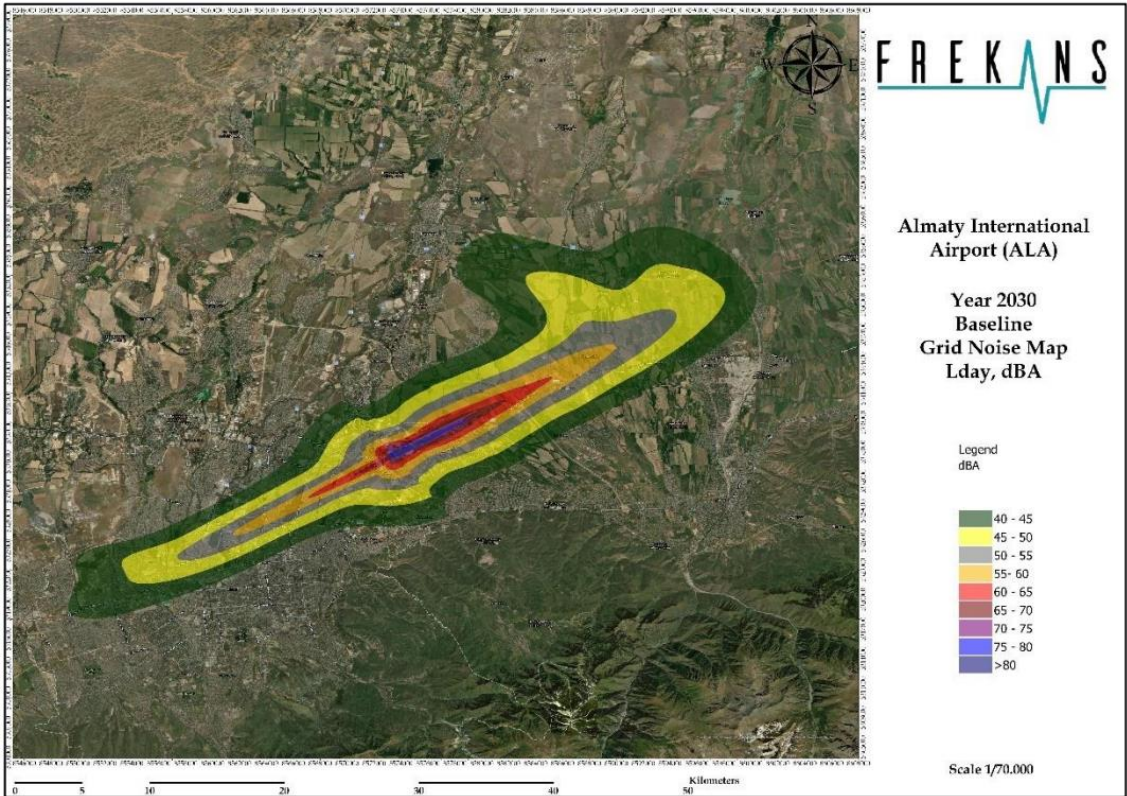
Source: Frekans Acoustics

**Table 11.19: Exposure Levels - 2025 baseline**

| 2025  | $L_{day}$            |                     | $L_{night}$          |                     |
|-------|----------------------|---------------------|----------------------|---------------------|
| dBA   | Area km <sup>2</sup> | Number of buildings | Area km <sup>2</sup> | Number of buildings |
| 40-45 | 147.6                | 32,725              | 142.3                | 30,042              |
| 45-50 | 88.0                 | 17,692              | 80.3                 | 16,104              |
| 50-55 | 44.5                 | 10,381              | 40.9                 | 10,050              |
| 55-60 | 21.2                 | 8,046               | 18.8                 | 7,285               |
| 60-65 | 8.2                  | 2,453               | 7.4                  | 2,008               |
| 65-70 | 3.4                  | 592                 | 3.0                  | 459                 |
| 70-75 | 1.6                  | 70                  | 1.4                  | 50                  |
| 75-80 | 0.8                  | 0                   | 0.8                  | 0                   |
| 80-85 | 0.4                  | 0                   | 0.4                  | 0                   |
| >85   | 0.2                  | 0                   | 0.1                  | 0                   |

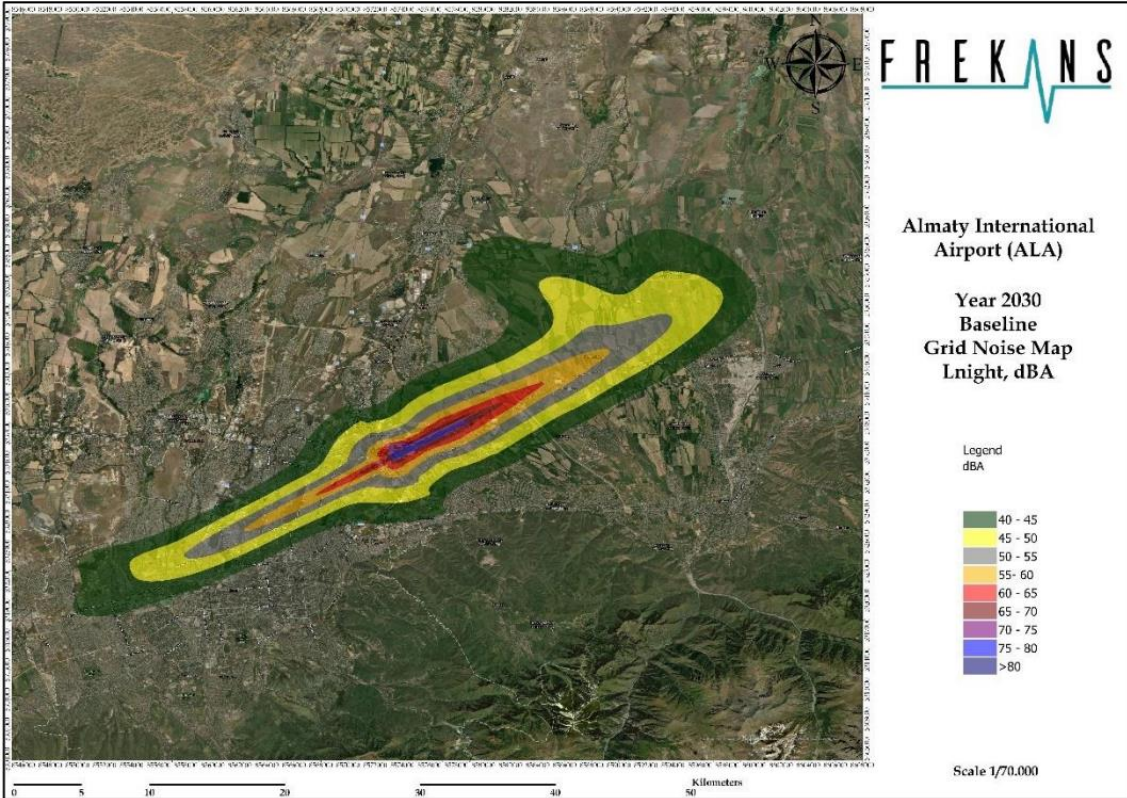


Figure 11.7: 2030 operational noise – no build scenario – daytime- L<sub>day</sub>



Source: Freqans Acoustics

Figure 11.8: 2030 operational noise – no build scenario – night-time- L<sub>night</sub>

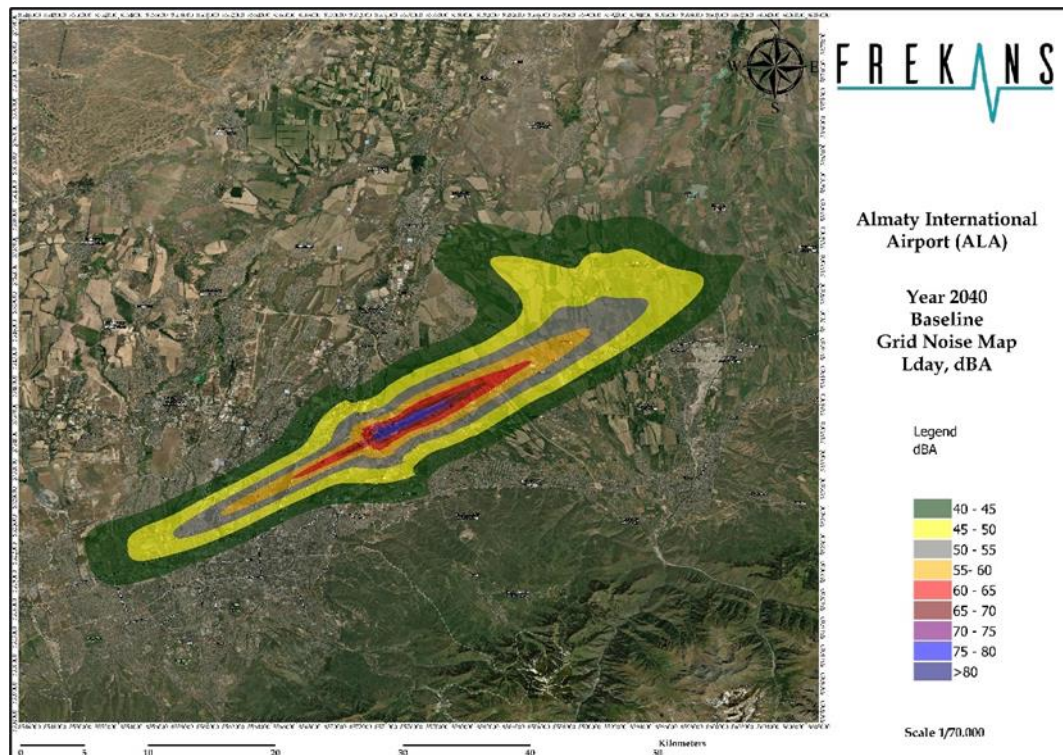


Source: Freqans Acoustics

**Table 11.20: Exposure Levels - 2030 no build scenario**

| 2030  | L <sub>day</sub>     |                     | L <sub>night</sub>   |                     |
|-------|----------------------|---------------------|----------------------|---------------------|
| dBA   | Area km <sup>2</sup> | Number of buildings | Area km <sup>2</sup> | Number of buildings |
| 40-45 | 155.8                | 39,178              | 150.4                | 35,212              |
| 45-50 | 96.6                 | 19,793              | 88.5                 | 17,877              |
| 50-55 | 49.9                 | 10,843              | 46.2                 | 10,353              |
| 55-60 | 25.6                 | 8,669               | 22.9                 | 8,306               |
| 60-65 | 10.0                 | 3,724               | 8.9                  | 2,912               |
| 65-70 | 4.2                  | 811                 | 3.7                  | 664                 |
| 70-75 | 1.8                  | 108                 | 1.6                  | 77                  |
| 75-80 | 0.9                  | 3                   | 0.9                  | 0                   |
| 80-85 | 0.5                  | 0                   | 0.4                  | 0                   |
| >85   | 0.2                  | 0                   | 0.2                  | 0                   |

**Figure 11.9: 2040 operational noise – no build scenario – daytime- L<sub>day</sub>**



Source: Frekans Acoustics



**Figure 11.10: 2040 operational noise – no build scenario – night-time-  $L_{night}$**

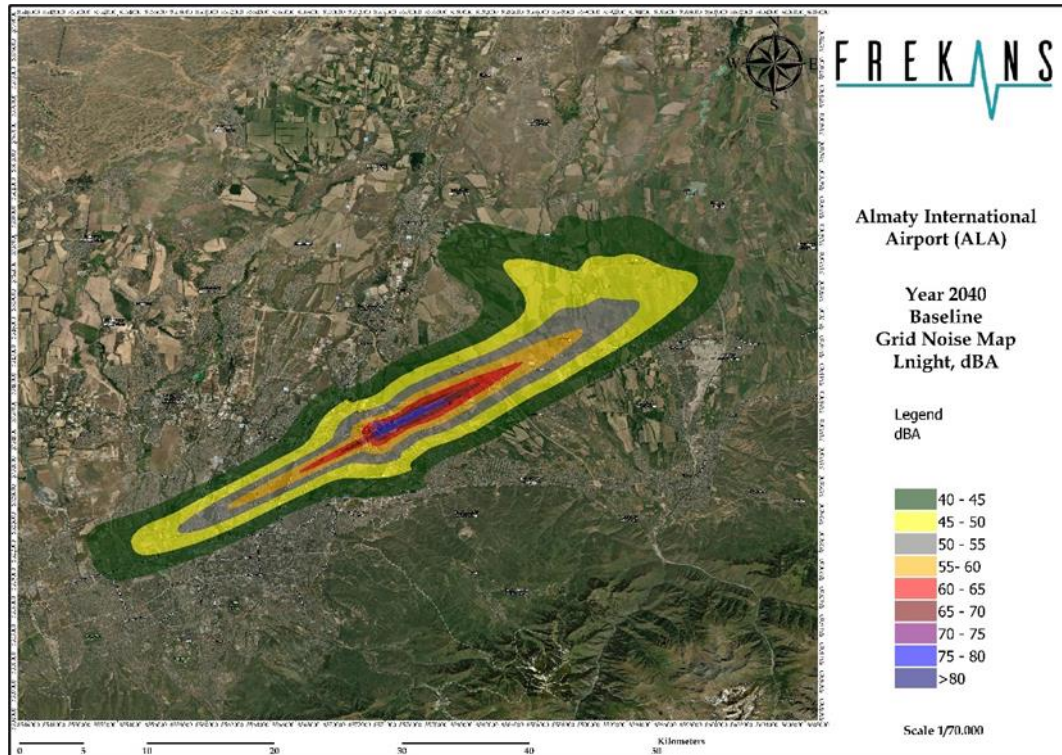
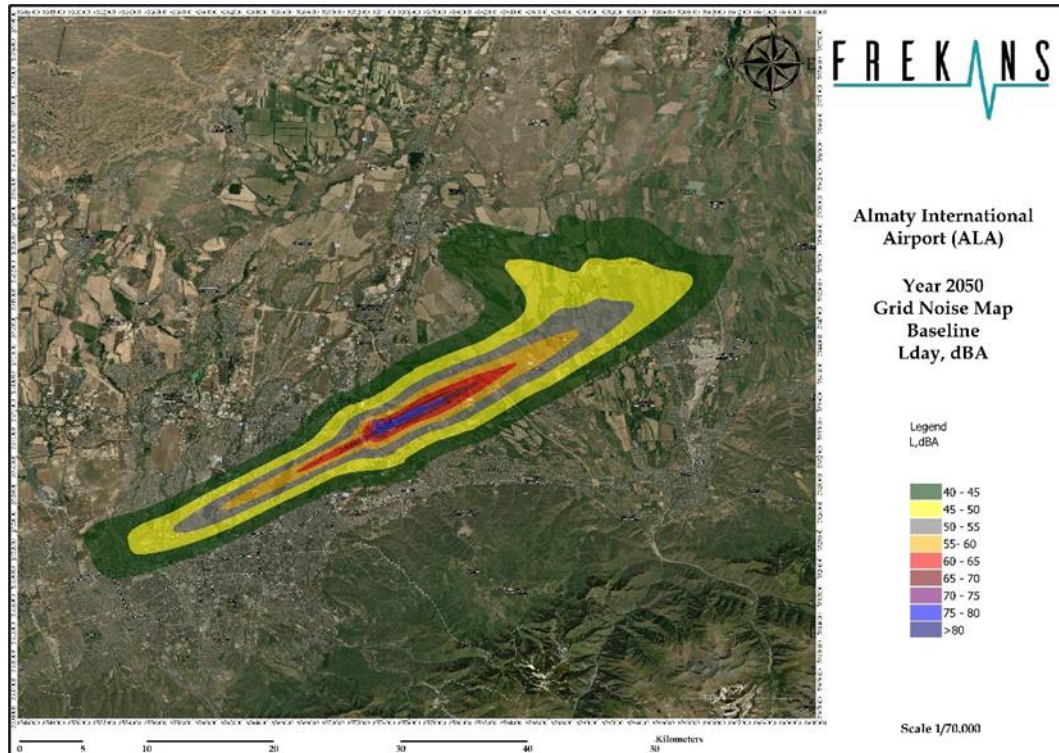


**Table 11.21: Exposure Levels - 2040 no build scenario**

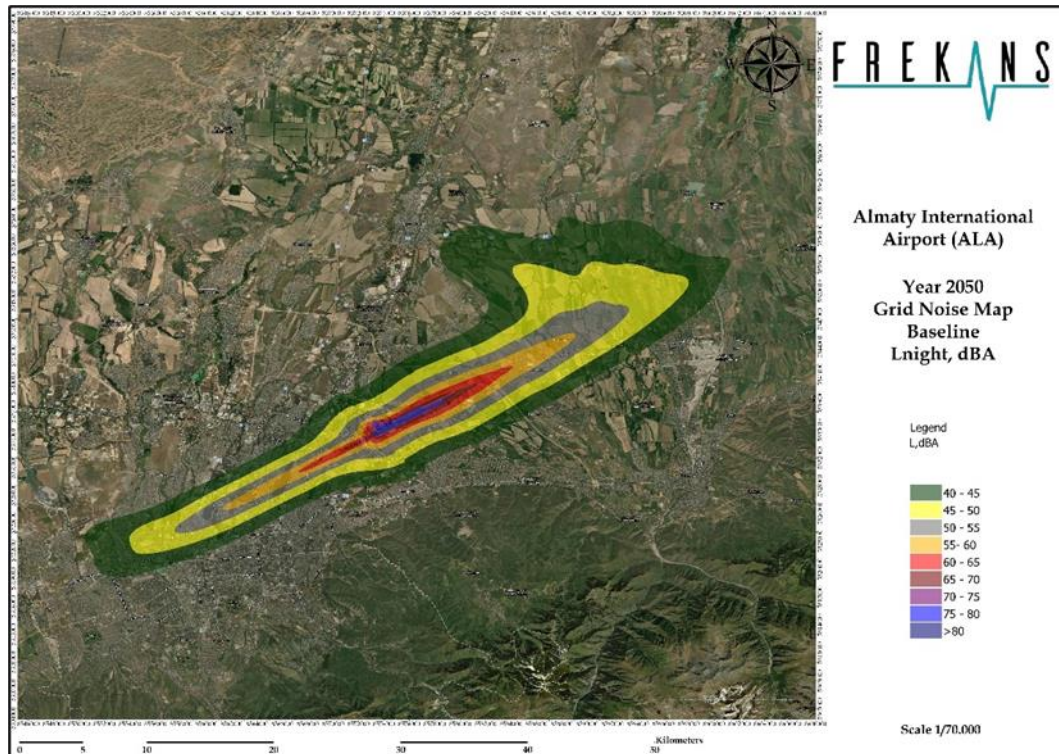
| <b>2040</b> | <b><math>L_{day}</math></b> | <b><math>L_{night}</math></b> |                            |                            |
|-------------|-----------------------------|-------------------------------|----------------------------|----------------------------|
| <b>dBA</b>  | <b>Area km<sup>2</sup></b>  | <b>Number of Buildings</b>    | <b>Area km<sup>2</sup></b> | <b>Number of Buildings</b> |
| 40-45       | 154,2                       | 38467                         | 150,1                      | 35288                      |
| 45-50       | 103,6                       | 20072                         | 94,9                       | 18110                      |
| 50-55       | 51,7                        | 11007                         | 47,8                       | 10493                      |
| 55-60       | 26,5                        | 8860                          | 24,0                       | 8650                       |
| 60-65       | 10,4                        | 4400                          | 9,3                        | 3518                       |
| 65-70       | 4,2                         | 843                           | 3,7                        | 698                        |
| 70-75       | 1,7                         | 111                           | 1,5                        | 83                         |
| 75-80       | 1,2                         | 3                             | 1,2                        | 1                          |
| 80-85       | 0,5                         | 0                             | 0,5                        | 0                          |
| >85         | 0,2                         | 0                             | 0,2                        | 0                          |

**Figure 11.11: 2050 operational noise – no build scenario – daytime-  $L_{day}$**



Source: Frekans Acoustics

**Figure 11.12: 2050 operational noise – no build scenario – night-time-  $L_{night}$**



Source: Frekans Acoustics



**Table 11.22: Exposure Levels - 2050 no build scenario**

| 2050  | L <sub>day</sub>     |                     | L <sub>night</sub>   |                     |
|-------|----------------------|---------------------|----------------------|---------------------|
| dBA   | Area km <sup>2</sup> | Number of buildings | Area km <sup>2</sup> | Number of Buildings |
| 40-45 | 144,3                | 30944               | 142,5                | 30123               |
| 45-50 | 90,1                 | 17715               | 85,9                 | 17061               |
| 50-55 | 45,4                 | 10108               | 43,7                 | 9991                |
| 55-60 | 23,1                 | 8628                | 22,0                 | 8495                |
| 60-65 | 8,8                  | 3298                | 8,4                  | 2972                |
| 65-70 | 3,5                  | 560                 | 3,3                  | 503                 |
| 70-75 | 1,4                  | 54                  | 1,4                  | 48                  |
| 75-80 | 1,2                  | 0                   | 1,1                  | 0                   |
| 80-85 | 0,5                  | 0                   | 0,5                  | 0                   |
| >85   | 0,1                  | 0                   | 0,1                  | 0                   |

11.5.13 Table 11.23, Table 11.24 and Table 11.25 present the assessment of noise impact in future years with respect to the baseline at three primary regions: Turksib, Guldala, and Al'Merek.

11.5.14 The changes in sound exposure are a result of the utilisation of the northern runway, implementation of eastern take-off and landing routes, and the deployment of advanced fleet technology with reduced noise emissions. The slight differences in totals are due to the noise impact buffers moving into or out of the community boundaries.

**Table 11.23: Impact Assessment 2030**

| 2030-2025       |                         |                     |         |          |        |                    |         |          |        |
|-----------------|-------------------------|---------------------|---------|----------|--------|--------------------|---------|----------|--------|
| Scale of Impact | Baseline Exceedance dBA | L <sub>day</sub>    |         |          |        | L <sub>night</sub> |         |          |        |
|                 |                         | Number of Buildings |         |          |        |                    |         |          |        |
|                 |                         | Turksib             | Guldala | Al'Merek | Total  | Turksib            | Guldala | Al'Merek | Total  |
| Positive Impact | <0                      | 21,568              | 2,468   | 0        | 36,565 | 21,489             | 2,443   | 0        | 36,381 |
| No Impact       | 0-1                     | 28,320              | 5,431   | 0        | 39,426 | 28,302             | 4,817   | 0        | 38,657 |
| Small           | 1-3                     | 42,727              | 12,686  | 3,420    | 85,425 | 42,853             | 13,668  | 3,416    | 86,737 |
| Medium          | 3-5                     | 4,318               | 4,066   | 853      | 12,993 | 4,390              | 4,106   | 846      | 13,135 |
| Large           | 5-8                     | 2,293               | 577     | 479      | 4,044  | 2,174              | 31      | 494      | 3,355  |
| Very Large      | >8                      | 3                   | 0       | 0        | 209    | 9                  | 0       | 0        | 215    |

**Table 11.24: Impact Assessment 2040**

| 2040-2025       |                         |                     |         |          |       |                    |         |          |       |
|-----------------|-------------------------|---------------------|---------|----------|-------|--------------------|---------|----------|-------|
| Scale of Impact | Baseline Exceedance dBA | L <sub>day</sub>    |         |          |       | L <sub>night</sub> |         |          |       |
|                 |                         | Number of Buildings |         |          |       |                    |         |          |       |
|                 |                         | Turksib             | Guldala | Al'Merek | Total | Turksib            | Guldala | Al'Merek | Total |

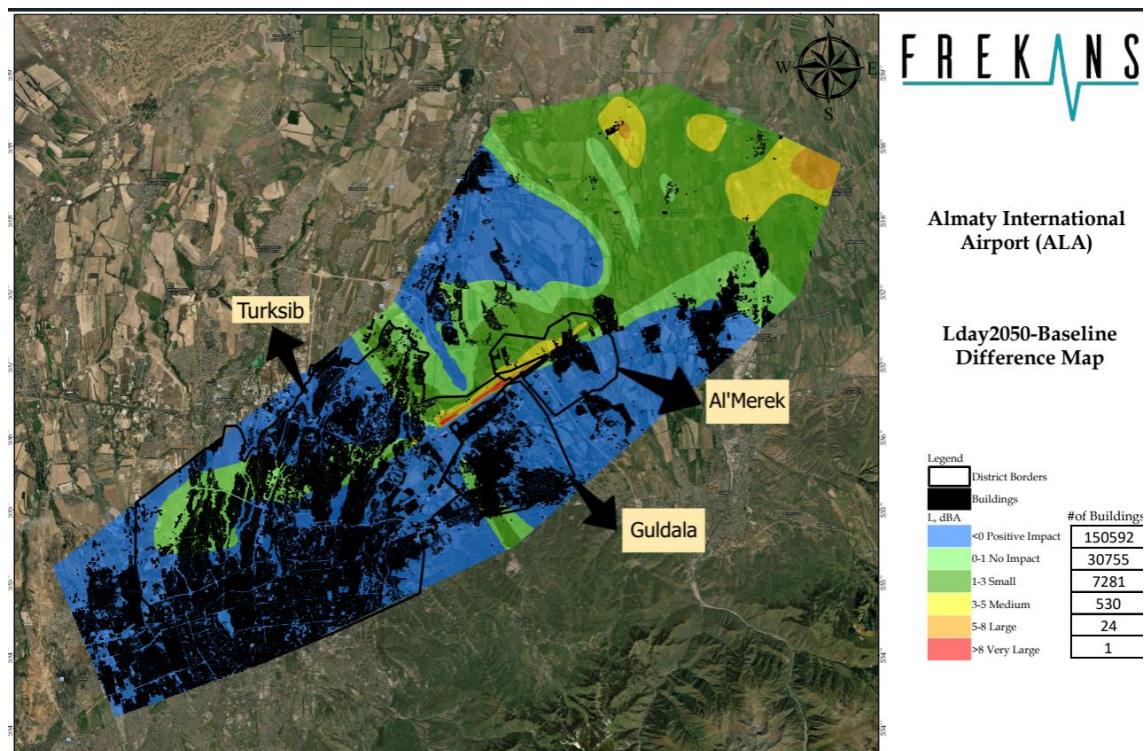
| 2040-2025       |     |        |        |       |         |        |        |       |         |
|-----------------|-----|--------|--------|-------|---------|--------|--------|-------|---------|
| Positive Impact | <0  | 78,006 | 17,692 | 3,040 | 138,165 | 77,632 | 17,939 | 3,034 | 137,943 |
| No Impact       | 0-1 | 18,872 | 3,412  | 526   | 30,024  | 19,245 | 3,503  | 534   | 30,597  |
| Small           | 1-3 | 1,813  | 3,835  | 905   | 9,885   | 1,985  | 3,557  | 898   | 9,770   |
| Medium          | 3-5 | 550    | 70     | 308   | 1,158   | 376    | 0      | 315   | 909     |
| Large           | 5-8 | 5      | 0      | 0     | 5       | 4      | 0      | 0     | 4       |
| Very Large      | >8  | 1      | 0      | 0     | 1       | 1      | 0      | 0     | 1       |

**Table 11.25: Impact Assessment 2050**

| 2050-2025       |                         |                     |         |          |         |                    |         |          |         |
|-----------------|-------------------------|---------------------|---------|----------|---------|--------------------|---------|----------|---------|
| Scale of Impact | Baseline Exceedance dBA | L <sub>day</sub>    |         |          |         | L <sub>night</sub> |         |          |         |
|                 |                         | Number of Buildings |         |          |         |                    |         |          |         |
|                 |                         | Turksib             | Guldala | Al'Merek | Total   | Turksib            | Guldala | Al'Merek | Total   |
| Positive Impact | <0                      | 77,724              | 20,420  | 2,942    | 101,086 | 79,411             | 20,479  | 2,909    | 102,799 |
| No Impact       | 0-1                     | 19,650              | 3,356   | 613      | 23,619  | 18,022             | 3,513   | 634      | 22,169  |
| Small           | 1-3                     | 1,786               | 1,173   | 936      | 3,895   | 1,755              | 949     | 905      | 3,609   |
| Medium          | 3-5                     | 46                  | 0       | 291      | 337     | 46                 | 0       | 328      | 374     |
| Large           | 5-8                     | 1                   | 0       | 0        | 1       | 1                  | 0       | 0        | 1       |
| Very Large      | >8                      | 1                   | 0       | 0        | 1       | 1                  | 0       | 0        | 1       |

- 11.5.15 In summary, the predictions indicate mainly small and medium scale increases in noise levels in 2030 relative to 2025 conditions in all areas both day and night. However, in Al'Merek, the changes are only increases, whereas there are also reductions in Turksib and Guldala.
- 11.5.16 Conditions in 2040 and 2050 relative to 2025 conditions are mainly decreases in noise levels in all areas particularly in the Turksib area. In Guldala and Al'Merek there is a greater proportion of 'no impact' or small changes.
- 11.5.17 The changes mainly reflect the influence of fleet modernisation. The contour map (Figure 6-52 reproduced in Figure 11.13) shows an increase in the blue zones, signifying positive or neutral impact changes, particularly in the Turksib region. The Al'Merek region also shows improved conditions compared with 2040 projections. It should be noted while reductions are made, noise levels may still exceed the WHO threshold values.

**Figure 11.13: Lday difference contours 2050 vs 2025 baseline**



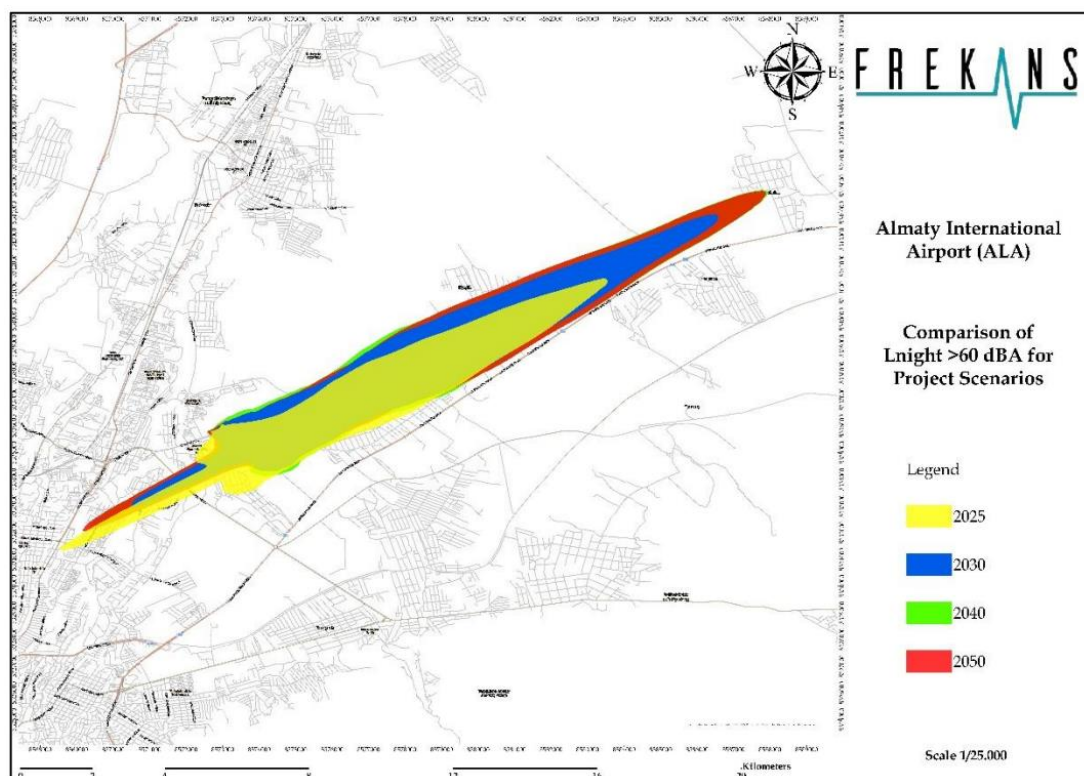
- 11.5.18 Detailed results presented in the Environmental Noise & Vibration Assessment Report<sup>2</sup> show some **major** and **moderate** adverse impacts are predicted in all assessment years at residential receptors (**high sensitivity**) within the Turksib, Almaty, Guldala and Al'Merek areas, a hospital (AP25 - **high sensitivity**) in Turksib/Almaty, and an educational establishment (AP78 – **high sensitivity**) in Al'Merek.
- 11.5.19 A sleep disturbance analysis was also conducted including a review of the number of buildings exposed to noise levels exceeding 60 dB L<sub>night</sub> that is used to test eligibility for the noise insulation program. The results are presented in Table 11.26 and Figure 11.14. This shows that exposure is predicted to be lower with the Project.

**Table 11.26: Buildings exposed to noise levels exceeding 60 dB L<sub>night</sub> with and without the Project**

|                                    | No build | Project |
|------------------------------------|----------|---------|
| <b>&gt;40 dB L<sub>night</sub></b> |          |         |
| 2025                               | 65,998   | 65,998  |
| 2030                               | 75,401   | 69,430  |
| 2040                               | 76,841   | 82,817  |
| 2050                               | 69,193   | 76,058  |
| <b>&gt;45 dB L<sub>dn</sub></b>    |          |         |
| 2025                               | 87,291   | 87,291  |
| 2030                               | 101,134  | 92,908  |
| 2040                               | 100,354  | 105,541 |
| 2050                               | 88,480   | 97,397  |
| <b>&gt;60 dB L<sub>night</sub></b> |          |         |
| 2025                               | 2,517    | 2,517   |
| 2030                               | 3,653    | 2,119   |

|      |       |       |
|------|-------|-------|
| 2040 | 4,300 | 3,292 |
| 2050 | 3,523 | 3,106 |

**Figure 11.14: Operational noise contours for areas exceeding 60 dB L<sub>night</sub> under the Project scenarios**



Source: Frekans Acoustics

## Road traffic noise

11.5.20 The assessment of changes in operational phase road traffic noise considers passenger and cargo access routes. It is noted traffic volumes are expected to increase by relatively large amounts by 2050 with passenger traffic increasing by 75% and cargo by 52%. This magnitude of change is expected to be noticeable. The affected areas are Turksib / Almaty and Al'Merek, where significant effects are predicted to arise.

## Conclusion

11.5.21 It is concluded that:

- Construction phase effects
  - Noise effects associated with construction activities are predicted to be **significant adverse** at a group of eight residential receptors (**high sensitivity**) near the terminal during all phases of construction when impacts are predicted to be **major** and **moderate adverse**. The margin by which the noise limit is exceeded is small and it is expected that this can be mitigated through standard measures.
  - Vibration effects due to construction activities are predicted to be **not significant** at all receptors.
  - Noise effects associated with the movement of construction road traffic are predicted to be **not significant** at all receptors.
- Operational phase effects

- Noise due to aircraft and ground support equipment is predicted to result in effects up to **moderate** and **major adverse (significant)** affecting residential, educational and hospital receptors (**high sensitivity**) within Turksib, Almaty, Guldala and Al'Merek, which is therefore assessed as **significant adverse**
- Road traffic associated with passengers and cargo is predicted to increase noticeably in the Turksib / Almaty and Al'Merek areas affecting residential and hospital receptors (**high sensitivity**). Effects up to **moderate** and **major adverse** are predicted, and are therefore assessed as **significant adverse**.

## 11.6 Mitigation

11.6.1 Table 11.27 provides a summary of mitigation and enhancement measures to address the impacts and effects identified in this chapter.

**Table 11.27: Summary of Mitigation Measures**

| Type of measure                              | Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction</b>                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| All phases                                   | <ul style="list-style-type: none"> <li>• Phase-Based Noise Monitoring and Community Engagement: Periodic noise level monitoring during construction phases, combined with regular community updates and an established complaint response mechanisms.</li> <li>• Temporary acoustic barriers: 4-metre high barriers along western construction boundary providing 8 to 10 dB reduction at critical location AP89.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Phase specific mitigation                    | <p><b>Phase 1 &amp; 1+2 Critical interventions at worst affected location (AP89)</b></p> <ul style="list-style-type: none"> <li>• The northwest facade of the buildings will experience the most significant impact, with noise levels reaching 6.7 dB(A) above the limiting value. It is estimated that a total of 8 dwellings will be affected, potentially impacting approximately 25 residents.</li> <li>• Low-noise equipment mandate: Specification of noise-optimised construction equipment reducing source levels by 3 to 5 dB(A).</li> <li>• Construction sequencing: Strategic work scheduling to minimise simultaneous high-noise activities.</li> <li>• Expected combined reduction: 10 to 12 dB total, bringing levels within compliance thresholds.</li> </ul> <p><b>Phase 2+3 &amp; Phase 3 Transition Management</b></p> <ul style="list-style-type: none"> <li>• Acoustic monitoring: Continuous noise level verification ensuring maintained compliance.</li> <li>• Adaptive equipment selection: Continued use of low-noise equipment specifications providing 3 to 4 dB source reduction.</li> <li>• Community communication: Proactive notification of remaining construction activities and expected completion timelines.</li> </ul> |
| Community engagement and monitoring          | <ul style="list-style-type: none"> <li>• Residential interface management: Direct communication channels with affected households at AP48, AP49, AP89, AP90, and AP91, including pre-construction surveys and post-completion verification.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Construction hours and equipment management: | <ul style="list-style-type: none"> <li>• Strict temporal controls: Enforcement of 09:00-22:00 construction window eliminating nighttime community disturbance, with enhanced restrictions.</li> <li>• Maintenance protocols: Daily equipment condition verification ensuring optimal noise performance and immediate replacement of non-compliant machinery.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Vibration mitigation Measures                | <ul style="list-style-type: none"> <li>• Selection of appropriate piling equipment. Where structural requirements permit, smaller and lighter pile driving equipment should be utilised to reduce the magnitude of generated vibrations.</li> <li>• Bored piles and Continuous Flight Auger (CFA) piles should be considered in the first instance.</li> <li>• Where driven piles remain necessary, variable energy hammers with adjustable impact force capabilities should be implemented to provide precise control over the driving energy.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Type of measure                                  | Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                  | <ul style="list-style-type: none"> <li>Hydraulic impact hammers should be considered as an alternative to diesel hammers</li> <li>Precautionary vibration monitoring from closest buildings is recommended at the commencement of construction activities involving piling operations.</li> <li>High-vibration activities should be scheduled during periods when potential impacts are minimised.</li> <li>Residents should be informed in advance about the construction schedule, expected vibration levels, and mitigation measures being implemented.</li> </ul>                                                                  |
| <b>Operation</b>                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Reduction of noise at source                     | <p>Fleet modernisation strategy at a higher rate of change (70% by 2050) than expected (30% by 2050) – In 2040, the base is 9.5% but increase to a higher rate of 50%.</p> <ul style="list-style-type: none"> <li>Enhanced monitoring of aircraft noise certification levels</li> <li>Collaboration with airlines to prioritise Chapter 14 aircraft deployment</li> <li>Economic incentives through differential landing fees for quieter aircraft (noise surcharge tariffs for take-off and landing can be implemented in ~5 years)</li> <li>Annual reporting of fleet composition progress toward noise reduction targets</li> </ul> |
| Noise abatement measures and operational regimes | <ul style="list-style-type: none"> <li>Departure and approach procedures e.g. Continuous Descent Operations, peak time route balancing strategy, advanced and night-time route optimisation</li> <li>Ground operations management and equipment modernisation</li> <li>Air traffic management techniques</li> <li>APU management</li> </ul>                                                                                                                                                                                                                                                                                            |
| Land use planning and management                 | <ul style="list-style-type: none"> <li>Enhanced municipality coordination to consider aircraft noise in planning decisions</li> <li>Expanded Noise Insulation Program to treat households and public facilities (e.g. kindergartens) in high-exposure zones (increasing from 100 to 140 buildings annually)</li> </ul>                                                                                                                                                                                                                                                                                                                 |
| Monitoring                                       | <ul style="list-style-type: none"> <li>Continue the continuous noise monitoring at Al'Merek, Guldala and Turksib</li> <li>Review noise contour maps annually based on operational regimes and aircraft types</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                |
| Operating restrictions                           | <p>Restrictions should only be implemented after exhausting other elements of the balanced ICAO 'Balanced approach'. Possible considerations include:</p> <ul style="list-style-type: none"> <li>Progressive restrictions to decrease Chapter 3 aircraft to 3% during night-time periods (22:00-09:00)</li> <li>Noise budget system implementation linking total noise exposure to operational capacity</li> <li>Differential charging structure based on aircraft noise certification levels</li> </ul>                                                                                                                               |

11.6.2 The Noise Management Plan shall define the measures to be applied and be developed in response to changing conditions and requirements. It should be noted that the details of the key commitments within the Noise Management Plan are yet to be negotiated. The Noise Management Plan shall also be reviewed following all significant safety incidents and updated as necessary.

## 11.7 Summary of residual effects

11.7.1 Residual effects after the application of mitigation are presented in Table 11.28. The residual effects on a receptor basis are indicated in Figures 11-14 to 11-16.

**Table 11.28: Summary of residual effects for construction and operational phases**

| Description of effect                                                                                                                        | Permanent or temporary | Sensitivity of receptor | Magnitude of impact                                       | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Residual effect           | Proposed monitoring                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|-----------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction phase</b>                                                                                                                    |                        |                         |                                                           |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                           |                                                                                                                                                                                 |
| Residential assessment location AP89<br>Noise levels from construction activities during all phases of construction                          | Temporary              | High                    | Moderate to major                                         | Significant adverse                                 | <ul style="list-style-type: none"> <li>10 to 12 dB noise reduction</li> <li>Measures to be set out and committed to within the Noise Management Plan</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                      | Not significant adverse   | Phase-based noise monitoring                                                                                                                                                    |
| <b>Operational phase</b>                                                                                                                     |                        |                         |                                                           |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                           |                                                                                                                                                                                 |
| Noise from aircraft and ground support equipment affecting surrounding communities including residential, hospital and educational receptors | Permanent              | High                    | Moderate to major                                         | Up to Significant adverse                           | <ul style="list-style-type: none"> <li>1.5 dB night-time noise reduction through route optimization (after 2030) in Turksib / Almaty (western routes)</li> <li>1.1 dB peak time route balancing (after 2030)</li> <li>0.5 dB APU management (Turksib and Guldala)</li> <li>Fleet modernisation – all areas</li> <li>4 to 7 dB ground noise reduction through infrastructure improvements</li> <li>7 to 9 dB indoor noise reduction through building insulation programs</li> <li>Measures to be set out and committed to within the Noise Management Plan</li> </ul> | Up to Significant adverse | Permanent noise monitoring stations<br><br>Enhanced monitoring of aircraft noise certification levels<br><br>Enhanced monitoring of APU usage duration and compliance reporting |
| Operational road traffic noise affecting residential and hospital receptors in the Turksib / Almaty and Al'Merek areas                       | Permanent              | High                    | Turksib/Almaty - Moderate to major<br>Al'Merek - Moderate | Up to significant adverse                           | <ul style="list-style-type: none"> <li>Enforce adherence to speed limits</li> <li>Promote and enable the use of public transport to minimise private car usage</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                            | Up to significant adverse | None                                                                                                                                                                            |



**Figure 11.15: Residual impacts of airport noise - 2030 (orange moderate, red major)**

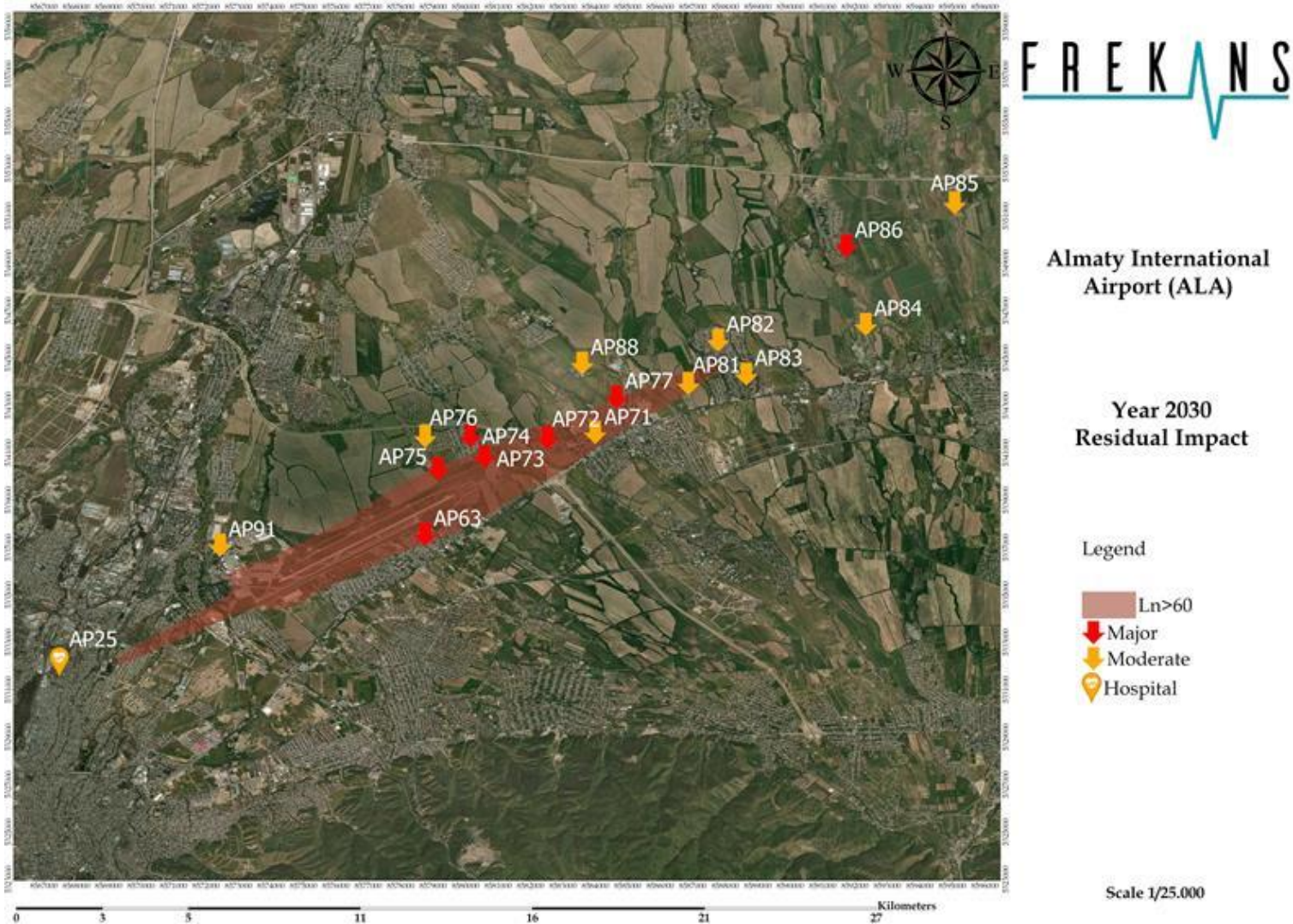




Figure 11.16: Residual impacts of airport noise – 2040 (orange moderate, red major)

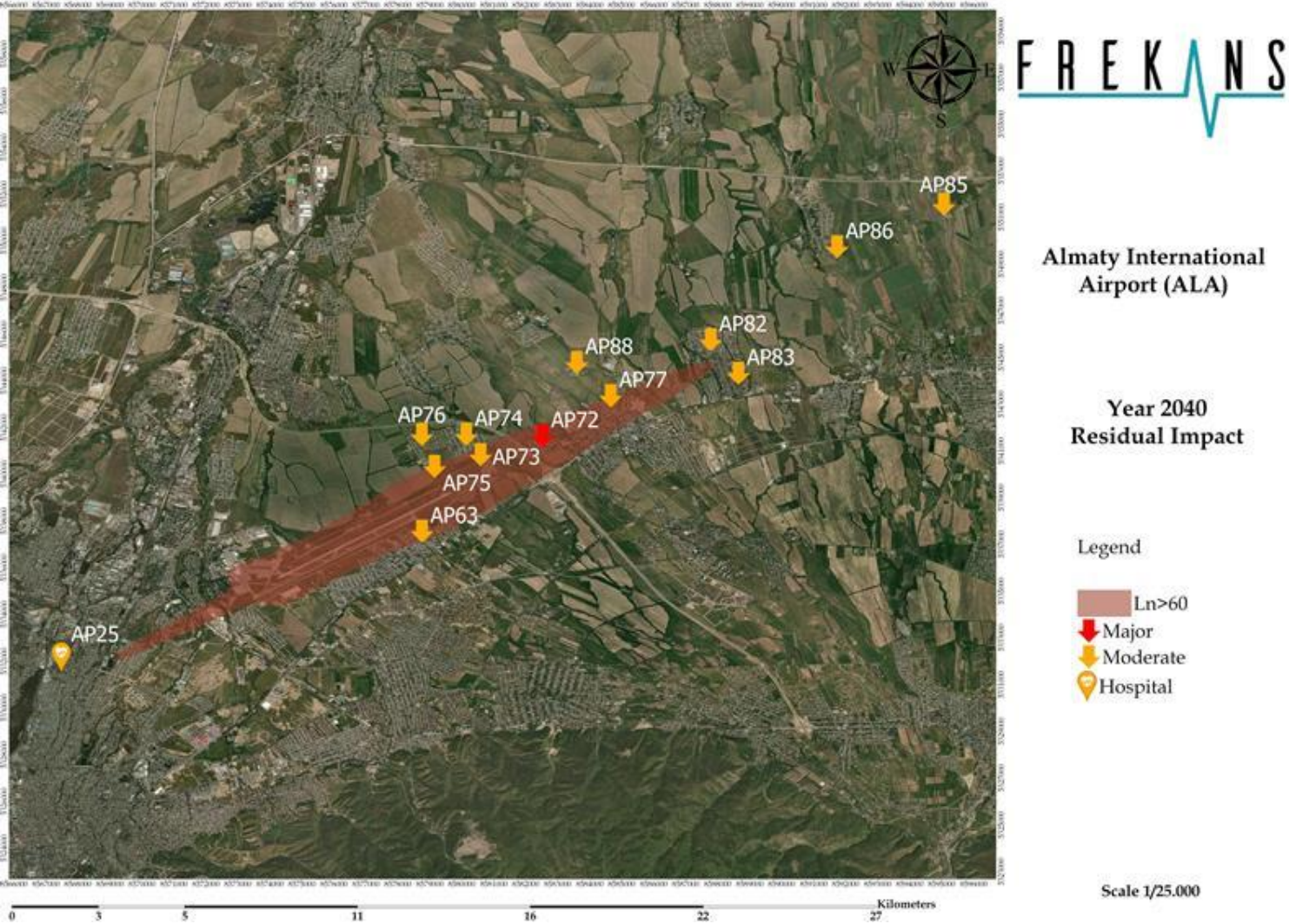
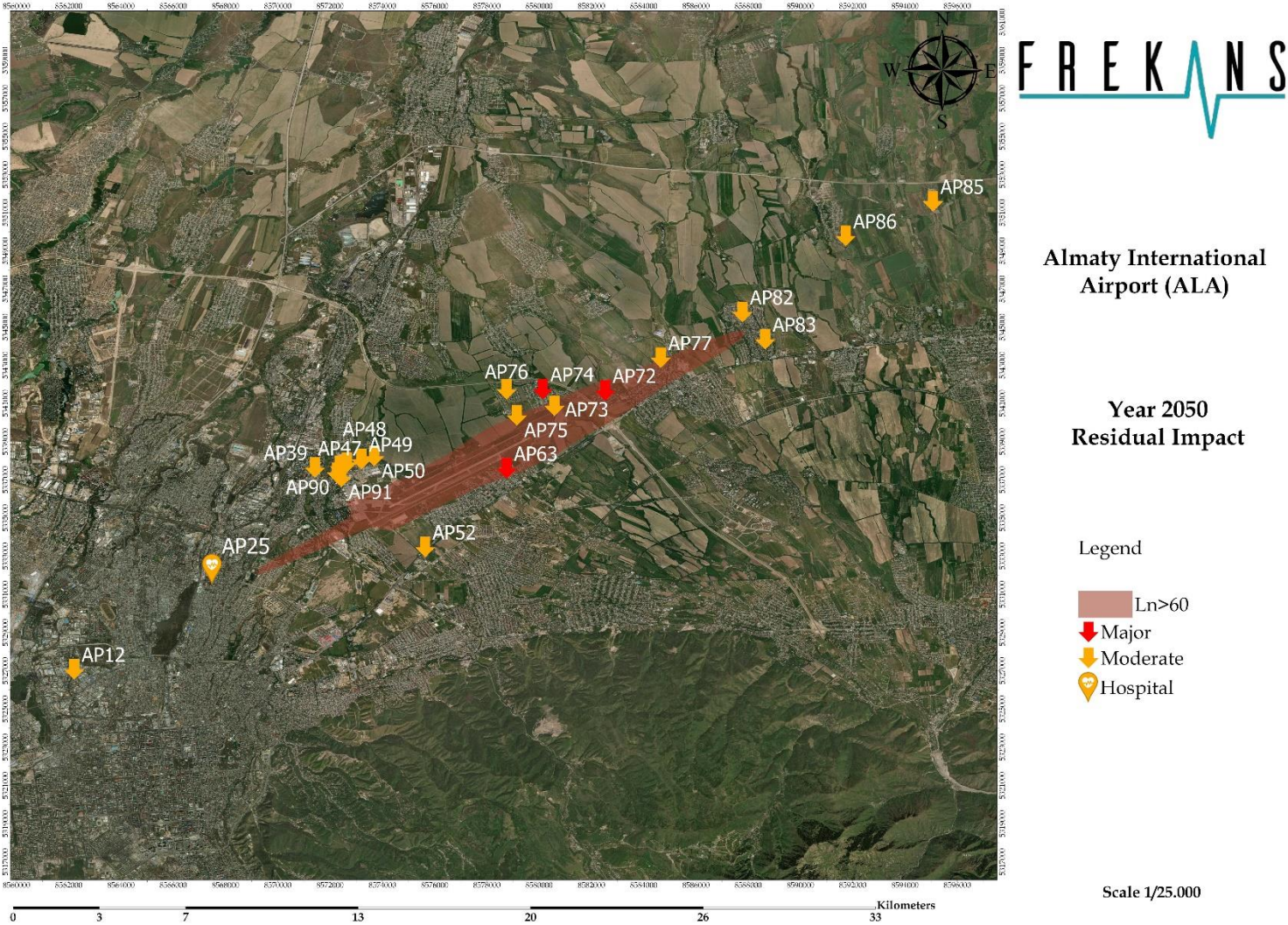
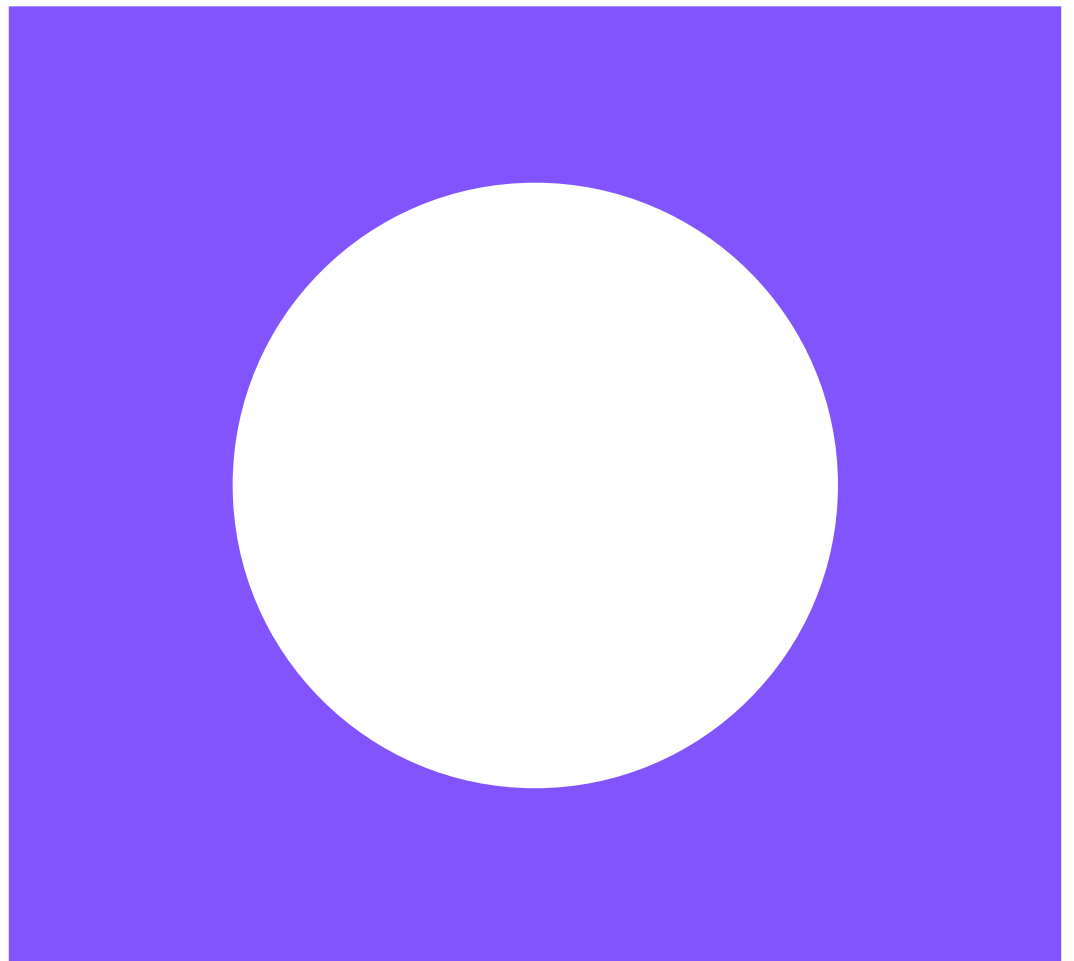
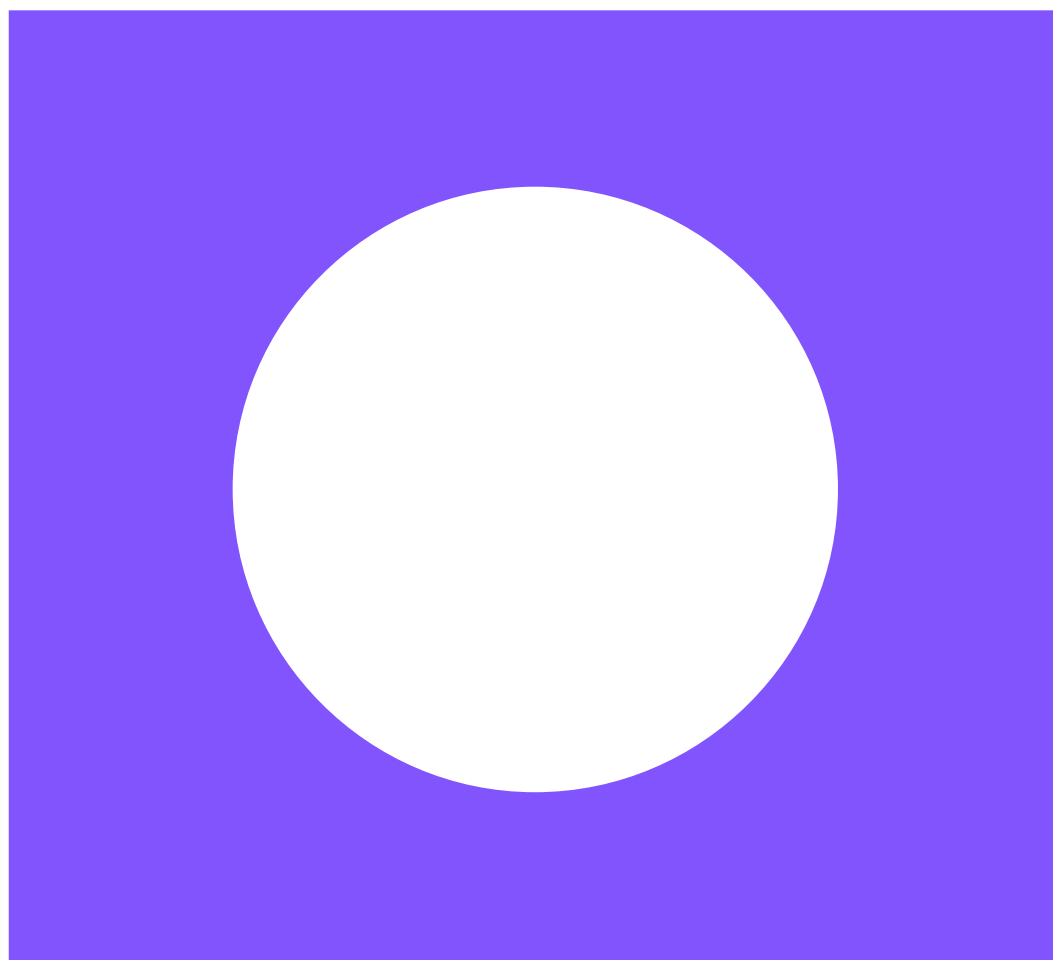




Figure 11.17: Residual impacts of airport noise – 2050 (orange moderate, red major)







# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 12

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 12**

September 2025

# Issue and Revision Record

| Revision | Date       | Originator | Checker | Approver | Description                                                      |
|----------|------------|------------|---------|----------|------------------------------------------------------------------|
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| C        | 12/09/2025 | SM         | KD      | BM       | Updated report with minor amendments following external comments |
|          |            |            |         |          |                                                                  |
|          |            |            |         |          |                                                                  |
|          |            |            |         |          |                                                                  |
|          |            |            |         |          |                                                                  |
|          |            |            |         |          |                                                                  |

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# Contents

|                                                                                   |    |
|-----------------------------------------------------------------------------------|----|
| Acronyms and abbreviations                                                        | 1  |
| 12 Traffic and transport                                                          | 2  |
| 12.1 Introduction                                                                 | 2  |
| 12.2 Methodology                                                                  | 2  |
| Applicable guidelines and standards                                               | 2  |
| Area of Influence                                                                 | 4  |
| Methodological approach                                                           | 7  |
| Limitations and assumptions                                                       | 7  |
| 12.3 Baseline                                                                     | 8  |
| Current baseline                                                                  | 8  |
| Future baseline                                                                   | 11 |
| 12.4 Potential impacts                                                            | 13 |
| Construction                                                                      | 13 |
| Operation                                                                         | 14 |
| 12.5 Assessment of effects                                                        | 14 |
| Construction phase effects                                                        | 15 |
| Operational phase effects                                                         | 17 |
| 12.6 Mitigation                                                                   | 18 |
| Construction phase                                                                | 18 |
| Operational phase                                                                 | 19 |
| 12.7 Summary of residual effects                                                  | 20 |
| Tables                                                                            |    |
| Table 12.1: Assumed traffic data                                                  | 12 |
| Table 12.2: Assumed traffic data for 2030, 2040, and 2050                         | 17 |
| Table 12.3: Summary of residual effects for traffic and transport                 | 21 |
| Figures                                                                           |    |
| Figure 12.1: Almaty Airport 1.5km area around the Almaty Airport by neighbourhood | 5  |
| Figure 12.2: Transport network around Almaty International Airport                | 6  |
| Figure 12.3: Major and potential congestion points in the vicinity of the Project | 9  |
| Figure 12.4: Construction equipment/vehicle route to construction areas           | 11 |
| Figure 12.5: Construction equipment parking area                                  | 11 |
| Figure 12.6: Almaty metro line and stations                                       | 13 |





# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                       |
|------------------------|--------------------------------------------------|
| ALA                    | Almaty International Airport                     |
| AOCC                   | Airport Operations Control Centre                |
| ATC                    | Air Traffic Control                              |
| ATMs                   | Air Traffic Movements                            |
| BAKAD                  | Big Almaty Ring Road                             |
| EBRD                   | European Bank for Reconstruction and Development |
| EHS                    | Environmental, Health, and Safety                |
| EPC                    | Engineering, Procurement, and Construction       |
| ESIA                   | Environmental and Social Impact Assessment       |
| ESR                    | Environment and Social Requirement               |
| IFC                    | International Finance Corporation                |
| HGV                    | Heavy Goods Vehicle                              |
| NOTAM                  | Notice to Airmen                                 |
| PPE                    | Personal Protective Equipment                    |
| RWY                    | Runway                                           |
| SAS                    | Surface Access Strategy                          |
| TMP                    | Traffic Management Plan                          |

# 12 Traffic and transport

## 12.1 Introduction

- 12.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) reports the findings of a review of existing data and proposed Project information and considers the likely impacts and risks to users of the transport network. The review informs the possible significant environmental effects on traffic and transport identified in this chapter as a result of the Project.
- 12.1.2 An assessment of possible significant effects has been undertaken for each of the sensitive receptors identified in the study area. Where necessary, commitments to mitigation measures have been made to manage any impacts on receptors.
- 12.1.3 Impacts on users of the transport network would be generated from Project related traffic movements, transportation of materials and equipment to site, transport of waste from site, as well as the commuting of personnel and passengers to and from the Airport.

## 12.2 Methodology

- 12.2.1 This section of the ESIA chapter presents the methodology applied to the assessment of impacts. The assessment of potential transport network effects has been carried out in accordance with the methodology outlined in **ESIA Chapter 4: ESIA scope and methodology**, which includes sensitivity of the receptor, the magnitude of the potential impact, and the significance of effects.

### Applicable guidelines and standards

- 12.2.2 The assessment has been undertaken considering relevant legislation, standards, and guidance as summarised in the sections below in addition to those mentioned in **ESIA Chapter 3: Policy, legal and institutional framework**.

### National requirements

- 12.2.3 The Republic of Kazakhstan has established a legal and regulatory framework to ensure the safe and efficient management of road traffic associated with infrastructure projects, including airport expansions. The most relevant legislation is the Law on Road Traffic (No. 194-V, 2014), which aims:
- “To establish the legal foundations and general conditions for the functioning of road traffic and the provision of its safety in the Republic of Kazakhstan.”*
- 12.2.4 This law outlines the responsibilities of project developers, road users, and authorities in maintaining traffic safety and regulating vehicle movement. It provides the basis for traffic planning, infrastructure design, and operational safety, including:
- Design and classification of roads, including highways and access roads to major facilities
  - Traffic regulation mechanisms, such as signage, markings, traffic lights, and enforcement
  - Vehicle operation standards, including technical compliance and safety features
  - Pedestrian and cyclist infrastructure, including dedicated paths and crossings
- 12.2.5 In addition to the Road Traffic Law, the Traffic Rules of the Republic of Kazakhstan (approved by Government Resolution No. 1196, 2014) establish a unified procedure for road use across the country. These rules define:

- Access control and intersection design for high-capacity roads
- Traffic flow management during construction and maintenance activities
- Temporary traffic control measures, including detours and signage for construction zones

## International requirements

### International Finance Corporation (IFC) requirements

- 12.2.6 The IFC provides a suite of Performance Standards and Environmental, Health, and Safety (EHS) Guidelines that must be followed for projects seeking IFC financing. For traffic-related impacts, the most relevant is IFC Performance Standard 4: Community Health, Safety, and Security, which aims:

*“To anticipate and avoid adverse impacts on the health and safety of the affected community during the project life cycle from both routine and non-routine circumstances.”*

- 12.2.7 To meet this objective, the IFC requires projects to assess and manage risks related to traffic safety, infrastructure capacity, and community exposure to increased vehicle movements. The IFC General EHS Guidelines and IFC EHS Guidelines for Airports (2007) provide specific recommendations for managing land-side traffic impacts, including:

- Conducting traffic impact assessments for new or expanded facilities
- Designing access roads and intersections to accommodate projected traffic volumes safely
- Implementing traffic control measures during construction to minimise disruption and risk
- Ensuring emergency access and pedestrian safety are maintained throughout the project

- 12.2.8 Where national traffic safety or road design standards are absent or less stringent, the IFC encourages the use of internationally recognised best practices, such as those from the World Bank Group or EU transport directives. The Project will therefore be structured to comply with both national regulations and IFC guidance, applying the more stringent standard where applicable.

### European Bank for Reconstruction and Development (EBRD) requirements

- 12.2.9 The Project has also been assessed against the EBRD Environmental and Social Policy (October 2024), specifically Environment and Social Requirement 1 (ESR1): Assessment and management of environmental and social risks and impacts; and Environment and Social Requirement 4 (ESR4): Health, Safety, and Security. The objectives of ESR1 and ESR4 can be summarised to require a project:

- To adopt a mitigation hierarchy to address environmental and social risks and impacts
- To avoid or minimise the risks to and impacts on the health and safety of workers and affected communities.

- 12.2.10 ESR1 and ESR4 require that transport and traffic-related risks—such as congestion, road safety, and construction-related disruptions—be identified early and addressed through appropriate mitigation measures. The EBRD also mandates that:

- Projects be designed to meet EU substantive standards where applicable.
- Operational and construction traffic management plans be developed to reduce risks and impacts on the public and ensure continuity of access.
- Monitoring and adaptive mitigation and management measures be implemented to respond to evolving traffic conditions during both construction and operation.
- In cases where Kazakhstan's national traffic regulations differ from EU standards, the EBRD requires the Project to adopt the more stringent of the two. This ensures that the Project

aligns with international best practices in traffic safety, infrastructure resilience, and community protection.

- 12.2.11 In addition, Briefing Note BN08<sup>1</sup> (January 2025, Version 1) provides guidance on minimising risks related to vehicles and pedestrian movement in workplaces, emphasising risk assessments, safe site layouts, vehicle control, and the development of a comprehensive Traffic Management Plan to ensure safety and compliance with EBRD standards.

## Area of Influence

- 12.2.12 The airport is located approximately 12km to the north-east of central Almaty, on the outskirts of the city. It is bordered by a mix of open land and residential settlements. The airport is located north of the settlement of Guldala, and north-east of other city districts, including Tbilisskaya and Kolhozshy, all of which lie within the wider region of Almaty.
- 12.2.13 The study area includes the proposed access road to the Project site, Mailin Street, as well as the existing and proposed transportation network and access roads around the Project site and communities settled along these roads. The area of influence extends with regard to the main commuting and transport routes of users of the site including workers, visitors, passengers as well as goods and vehicles.
- 12.2.14 The areas most likely affected include Amresek, Guldala, Panfilovo, and Turksib (see Figure 12.1). These neighbourhoods fall within or near a 1.5km zone surrounding the airport. Amresek and Guldala, in particular, are situated along routes that GPS navigation systems commonly use to direct vehicles traveling to and from the airport. This has led to increased traffic flow through residential streets, especially during peak hours and periods of high flight activity. The Turksib Akimat has expressed concerns about congestion in these areas, noting that the streets are often very busy during times when international flights arrive. Panfilovo, while slightly further out, is still within the zone and connected to the airport via key transport corridors, making it susceptible to overflow traffic.
- 12.2.15 The primary roads facilitating access to the airport are designated as the A351 and A3. These are major arterial routes that serve as the key access routes of the airport's connectivity to the broader Almaty region. The A351 and A3 are regional highways, and their proximity to the airport makes them the main conduits for passenger and cargo movement.
- 12.2.16 The spatial relationship between the airport, its access roads, and surrounding neighbourhoods clearly indicates that Amresek, Guldala, Panfilovo, and Turksib are likely to be the most impacted by Project related land traffic.

---

<sup>1</sup> European Bank for Reconstruction and Development. (2025). Working safely around workplace transport (BN08). EBRD Briefing Note, Version 1.  
[https://www.ebrd.com/content/dam/ebd\\_dxp/assets/pdfs/environment---sustainability/implementation-performance-requirements/prs/briefing-notes-6-10/english/EBRD\\_HS\\_BN08.pdf](https://www.ebrd.com/content/dam/ebd_dxp/assets/pdfs/environment---sustainability/implementation-performance-requirements/prs/briefing-notes-6-10/english/EBRD_HS_BN08.pdf)

**Figure 12.1: Almaty Airport 1.5km area around the Almaty Airport by neighbourhood**

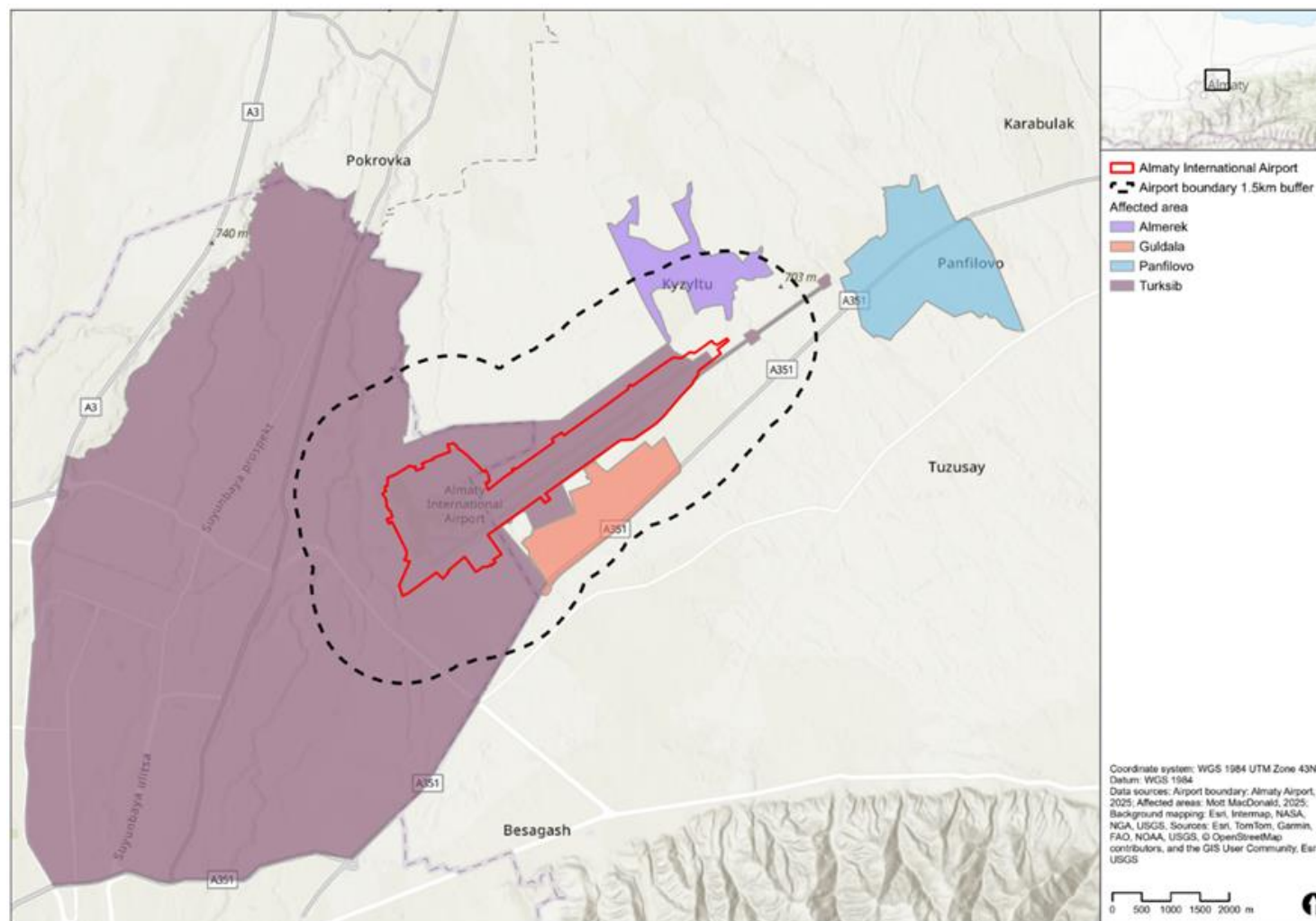
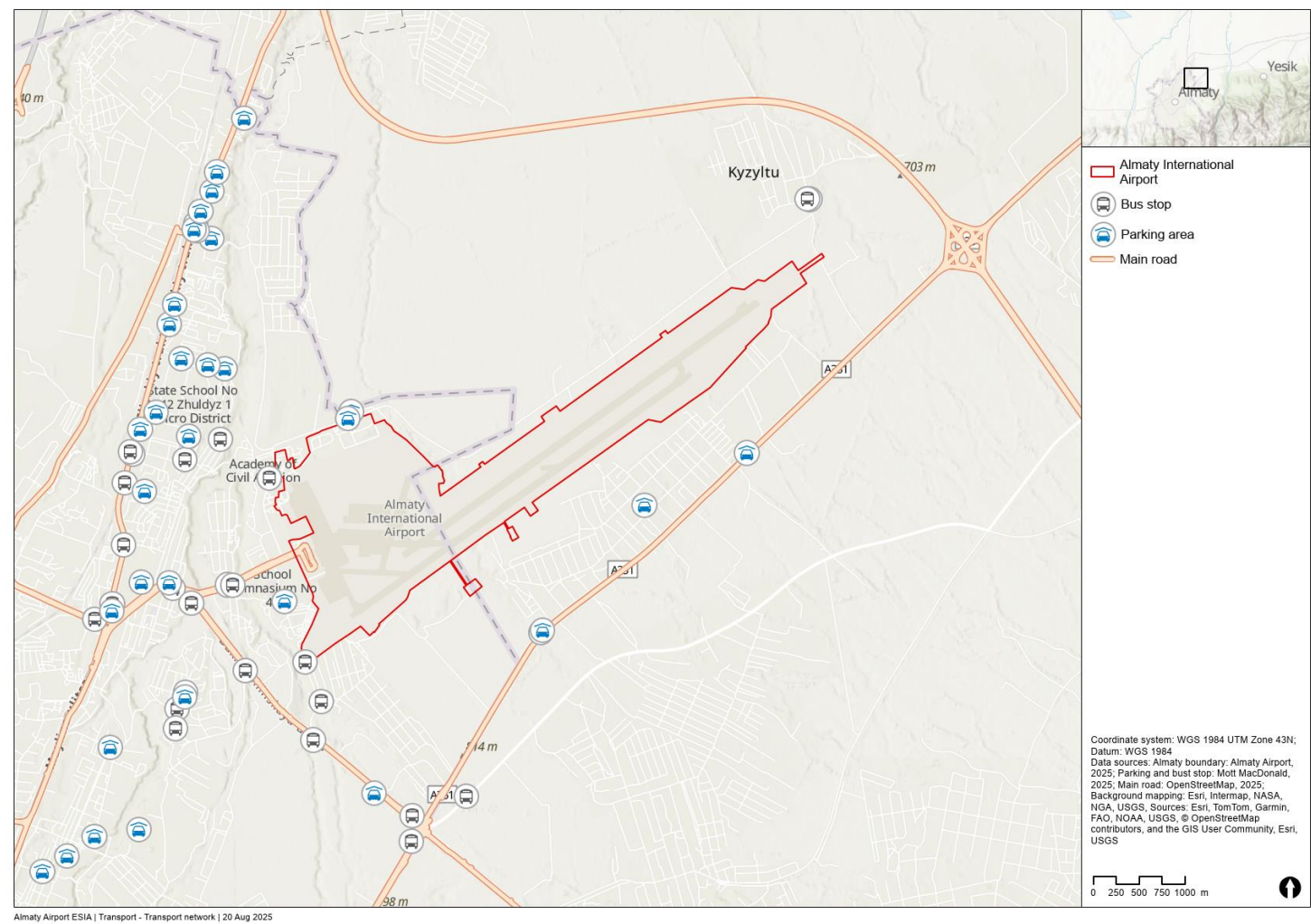


Figure 12.2: Transport network around Almaty International Airport



## Methodological approach

- 12.2.17 The traffic and transport impact assessment has been informed by a review of relevant and available secondary data sources. Secondary data has been drawn from existing traffic statistics, airport master plans, and relevant planning documents. Design layouts for new and upgraded facilities have been reviewed to understand future traffic generation and circulation patterns.
- 12.2.18 Baseline conditions have been established by analysing current (or historically available) traffic volumes. The assessment has identified existing constraints such as congestion points, limited access points, and parking capacity. Freight and service vehicle routes within and around the airport have also been investigated to understand operational traffic flows.
- 12.2.19 The magnitude of impact has been assessed by evaluating projected changes in traffic volume, potential degradation in existing conditions, increases in heavy vehicle movements, and the extent and duration of construction-related disruptions. The assessment has distinguished between impacts during the construction and operational phases.
- 12.2.20 The significance of effect has been determined by combining receptor sensitivity with impact magnitude, following the matrix-based approach described in Table 4.4 in **ESIA Chapter 4: ESIA scope and methodology**. Where the significance of impacts is identified as **moderate adverse** or **major adverse**, appropriate mitigation measures have been proposed to reduce their significance to acceptable levels. The impact assessment is based on professional judgement and interpretation of the data available.

## Limitations and assumptions

- 12.2.21 Baseline traffic conditions at the access roads around the airport, as well as terrestrial traffic count data and traffic modelling for the construction and operational phases of the Project have been limited to date. This chapter has been prepared using publicly available data and information provided by Almaty International Airport (ALA) has been used to estimate baseline conditions and expected traffic load during construction and operation.
- 12.2.22 For the construction phase, data has been received that includes volumes of excavation and demolition waste material, as well as information on reuse and disposal practices. These figures have informed the impact assessment of road traffic volumes related to material transport and waste management activities during construction.
- 12.2.23 The assumptions related to accommodation camp location, transport mode (shared minibuses or public transport), and on-site welfare provisions may not fully represent the arrangements for all contractors involved in the Project. This limitation has been considered when interpreting workforce-related traffic and infrastructure impacts.
- 12.2.24 Regarding the operational phase, current data includes the weight of waste generated at the airport. This has been used to provide an assumption of servicing and deliveries associated with the airport.
- 12.2.25 Forecasts have been updated using the Base Case projections from July 2025 technical studies (Noise & Vibration modelling inputs and Project Horizon Traffic Forecasts Outputs V6.0<sup>2</sup>), supplemented by transfer/transit adjustments from the Traffic Advisor memorandum.

---

<sup>2</sup> Mott MacDonald (2025). Project Horizon Traffic Advisor in relation to the new Investment plan of Almaty International Airport in Kazakhstan, Traffic Forecasts Outputs (Base, Low, Climate) - DRAFT (NONRELIANCE BASIS), Version 6.0, 29 July 2025.



## 12.3 Baseline

### Current baseline

#### Transportation infrastructure in Almaty region

- 12.3.1 The Almaty region benefits from strategically important transport network, serving as a key hub along the main corridor connecting South-East Asia and Europe. The region is integrated into national and international transport systems through road, rail, and air links, supporting both passenger and freight movement. Railways play a significant role in long-distance travel and trade across Kazakhstan and with neighbouring countries such as Russia, China, and other Central Asian states. Within this broader context, ALA, operational since 1935, is playing a critical role in facilitating domestic and international air travel and cargo transport. The airport is primarily accessed by road, which connects it efficiently to Almaty city and surrounding areas, supporting the movement of passengers, goods, and construction-related logistics.
- 12.3.2 According to the 2022 ESIA data, within the Almaty region there are 317 bus transport routes including 47 intra-city, 126 intra-regional, 40 intra-district and 104 suburban routes. Overall, 33 private bus operators in the regions provide transportation services via 14 central bus stations and two bus terminals in Taldykorgan and Kapshagai<sup>3</sup>. The roads in the region have a total length of 9,316.8km including 27% of national roads (2,529km) and 73% of regional and local roads (4,787.8km). About 72% of regional roads have black macadam coating (4,861.8 km), about 11% have asphalt pavement (788km), 15% are gravel-macadam coated (1,020km) and 2% are unsurfaced (earth) roads (118km).
- 12.3.3 Transport remains a major concern in Almaty and there is currently no direct rail access to ALA. Although several interchanges and the Big Almaty Ring Road (BAKAD) have been completed, rapid population growth and increasing car ownership strain the system. Public transport provision is at 65.7%, road infrastructure at 89.8%, and street lighting at 84.0%. By 2024, it was estimated that the city needed 1,000 more buses, 200 trolleybuses, and 30 new routes. To address this, Almaty has adopted a Transport Master Plan to 2030, aiming to develop multimodal corridors, expand the metro, convert buses to gas and electricity, and build three major transport hubs. By 2026, the plan envisions 14 transport corridors and a more mobile, accessible city. There are also plans to connect BAKAD with the airport entry by a straight road to bypass the residential areas<sup>3</sup>.
- 12.3.4 As mentioned in **ESIA Chapter 8: Community**, Turksib Akimat reported that GPS apps and digital maps are directing traffic from BAKAD through the residential areas of Almerek and Guldala. The Akimat expressed concern that these streets are already congested during peak hours and when most international flights arrive. However, the Akimat also mentioned that the airport has adjusted its night flight schedule to help alleviate traffic.

#### Traffic in the vicinity of the airport

- 12.3.5 According to the 2022 ESIA, it was reported that seven bus routes connect the city and airport and will allow commuting to the Project. However, only one bus route operates at night. A bus trip from the city may take 30-55 minutes by e-ticket or cash. Another two options to commute to the airport are travelling by car or taxi. Three taxi operators provide taxi service in the city, including a low-cost taxi operator.
- 12.3.6 Considering the limited detailed traffic information for existing and future traffic flows, existing traffic flows along Mailin Steet have been estimated from a three-day traffic survey undertaken

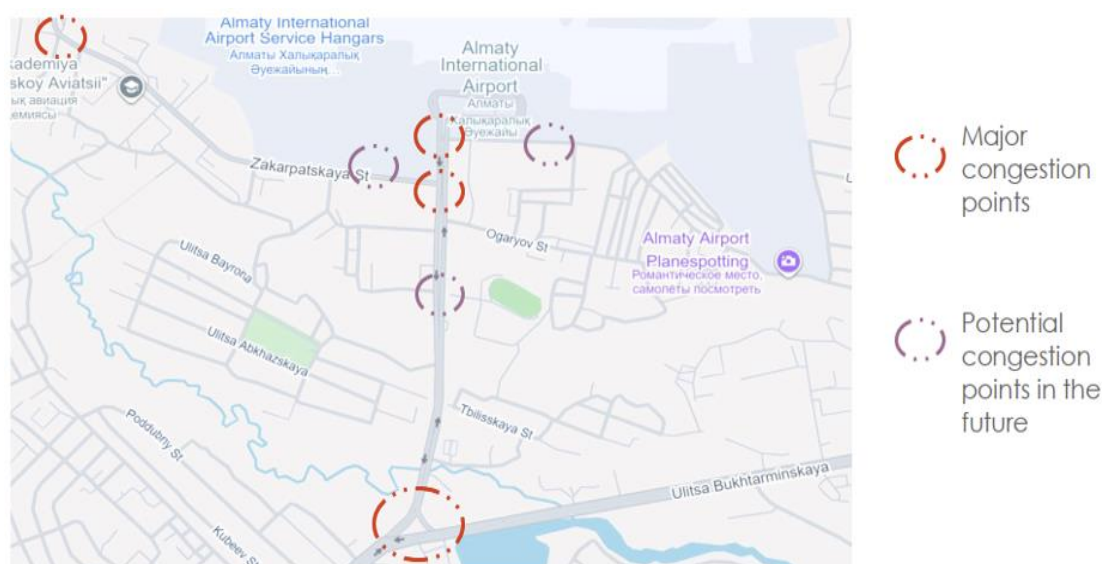
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<sup>3</sup> Institute of Economic Research (2024) Infrastructure development in Almaty.  
[https://eri.kz/ru/Novosti\\_instituta/id=6390](https://eri.kz/ru/Novosti_instituta/id=6390)

in 2021 which informed the 2022 ESIA. According to this survey, the volume of flows (total) at Mailin Street was 44,500 vehicles. This has been used to estimate the proportion of traffic on Mailin Street that is associated with the airport using data from the airport vehicle entrance and exit barriers and the proportion which is local road traffic. This survey indicated that approximately 60% of traffic on Mailin Street was local traffic and the remaining 40% was associated with the airport<sup>4</sup>.

- 12.3.7 Major congestion points in the vicinity of the Airport are presented in Figure 12.3. Accordingly, Zakarpatskaya, Ogaryov, and Mailin Streets are critical corridors for airport access and may require targeted traffic management interventions to maintain uninterrupted flow during and after the expansion works. Mailin Street is the main corridor which has three major congestion points indicated and one potential point in the future. While the map highlights specific areas of concern<sup>5</sup>, congestion patterns can vary along these corridors, especially during peak hours.

**Figure 12.3: Major and potential congestion points in the vicinity of the Project**



Source: ALA, 2025

### Current traffic at the airport

- 12.3.8 A traffic management procedure is currently applied at the airport, involving access control systems and designated parking zones to regulate vehicle flow and support operational efficiency. ALA offers free parking for up to 15 minutes, limited to two entries per day. Beyond that, parking fees range from KZT 300 to KZT 3,500 depending on the duration (from one to 24 hours) and parking area which consists of four designated zones<sup>6</sup>. ALA's existing car parking capacity is approximately 1400 cars, including at least 16 spaces for disabled parking. Parking for disabled users is free of charge.
- 12.3.9 An evaluation of access barrier data at the airport from January 2024 through May 2025 reveals seasonal fluctuations in vehicle entries and exits.
- 12.3.10 The data indicates that activity is highest during the winter and spring months. December 2024 and January 2025 recorded some of the highest volumes, with daily vehicle counts exceeding

<sup>4</sup> Since the data is collected from main gates (entrance) of the ALA, this represents the ratio of the roads on the western side (especially, Mailin St.).

<sup>5</sup> Transferred from ALA and no surveys have been conducted on these streets.

<sup>6</sup> Almaty International Airport. <https://alairport.com/en-EN/park/page/parking>

20,000. This elevated demand continued into March, April, and May 2025, suggesting a sustained period of increased airport usage during the late winter and spring seasons. In contrast, the months of October and November 2024, as well as February 2025, exhibited slightly lower levels of parking activity. During these months, the average daily vehicle entry count was approximately 19,000, representing a slight decrease compared to the peak winter months.

- 12.3.11 Overall, the review confirms that parking demand at the airport is subject to slight seasonal variation, with peaks during the colder and transitional months. These findings are essential for informing the design and operational planning of future parking infrastructure, ensuring that capacity is aligned with observed demand patterns. The results also highlight the importance of flexible operational strategies to accommodate fluctuations in usage throughout the year.

### Current construction traffic management practices

- 12.3.12 Additional traffic load on the existing road network will be generated by transportation of materials and equipment/consumables, transport of waste and excavation materials from the site and daily commute of personnel to and from the Project. A substantial volume of excavation and demolition waste is expected to be generated during the construction phase of the Project. The total estimated waste amounts to approximately 2,023,738m<sup>3</sup> (or 3,342,258 tonnes). Of this, around 1,068,627m<sup>3</sup> (52.8%) will be reused on site, either directly or following chemical processing. The remaining 955,112m<sup>3</sup> (47.2%) will be removed from the site, requiring off-site transport and disposal. Please refer to **ESIA Chapter 13: Waste and resources** for detailed information.
- 12.3.13 Based on the above tonnes of excavation and demolition waste to be transported off-site during the construction phase, and assuming a truck capacity of 15m<sup>3</sup> and a weight limit of 20 tonnes, the total number of truck trips required is approximately 78,700.
- 12.3.14 This material movement will contribute significantly to traffic volumes on surrounding roads. It underscores the need for careful logistics planning and traffic mitigation measures, especially during peak construction periods (October 2025 to November 2027), when approximately 426 workers of YDA (one of the Engineering, Procurement, and Construction (EPC) contractors) will also be commuting daily.
- 12.3.15 A Construction Traffic Plan has been developed to manage the movement of vehicles and personnel within the Project site during the construction phase. The plan is designed to ensure safety, maintain operational continuity, and minimise risks such as runway incursions and foreign object debris. According to the plan:
- Construction access will be controlled through designated gates. Specific routes have been assigned for each construction phase, with clear signage and traffic flow controls in place. Accordingly, representatives of the contractor, equipment, vehicles and drivers enter the territory of ALA from the landside via gates North-East of Runway (RWY) 05L/23R and via Gate 11 North-West of RWY 05L/23R (see Figure 12.4).
  - All vehicle movements will be supervised by airport authority personnel, and vehicles will undergo inspections to ensure compliance with airside safety standards. Vehicles without radio communication or required safety features will be escorted as per aviation regulations.
  - Coordination with Air Traffic Control (ATC) and the Airport Operations Control Centre (AOCC) will be maintained throughout construction to avoid interference with aircraft movements. High-risk intersections will be strictly controlled and Notice to Airmen (NOTAM) will be issued as needed to manage temporary closures.
  - Contractors are responsible for ensuring that all personnel are trained in airside safety and driving procedures. Designated parking areas for construction equipment have been

established, and traffic schedules will be managed to avoid peak airport hours. The construction equipment parking area is presented in Figure 12.5.

- Following the completion of each construction phase, all equipment will be removed, the area will be cleared of debris, and pavement markings will be restored to prepare the site for operational use.

**Figure 12.4: Construction equipment/vehicle route to construction areas**



Source: ALA, The "Horizon" project Construction Traffic Plan, ALA

**Figure 12.5: Construction equipment parking area**



Source: ALA, The "Horizon" project, Construction Traffic Plan, ALA

## Future baseline

- 12.3.16 Future traffic numbers associated with the expansion of the airport have been estimated within the scope of 2022 ESIA. Table 12.1 presents the traffic data used in that assessment as part of the Air Quality assessment for the 2022 ESIA.



**Table 12.1: Assumed traffic data**

| Road          | 2021 flows (total)                       | 2031 without Scheme* | 2031 with Scheme* |
|---------------|------------------------------------------|----------------------|-------------------|
| Mailin Street | 44,500 (3.3% Heavy goods vehicles (HGV)) | 48,300 (3.3% HGV)    | 58,500 (3.3% HGV) |

\*Scheme refers to the development assessed within the 2022 ESIA. It is assumed that this Project is included within the traffic estimates in the 2022 ESIA.

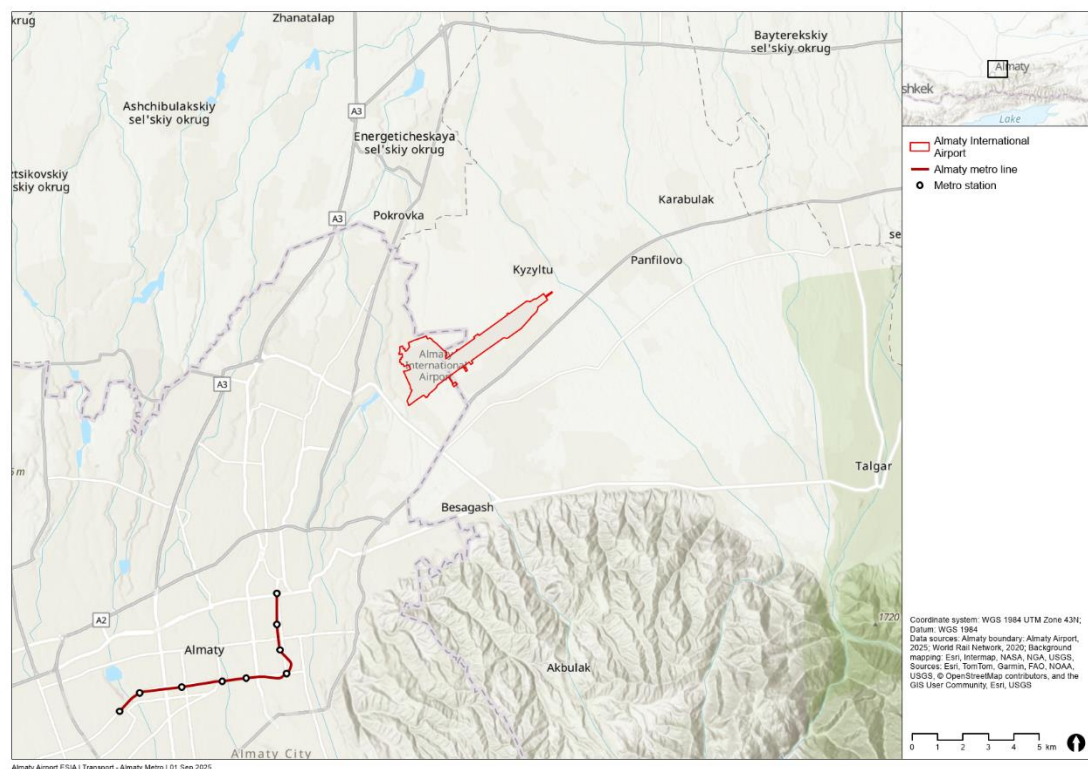
Source: 2022 ESIA

- 12.3.17 The traffic data have been estimated based on future passenger projections assuming a linear relationship between passenger numbers and the airport vehicle entrance numbers in 2019. Local traffic has been assumed to remain constant in future years and only the proportion of traffic related to the airport has been assumed to increase as the areas around Mailin Street are not expected to be further developed.
- 12.3.18 It is important to note that these figures were calculated for the 2022 ESIA and may not fully account for the traffic impacts of the Project. Given the broader scope and increased scale of the Project, it is anticipated that more increase in traffic volumes than those projected in the 2022 ESIA may occur. This is because the current Project includes additional elements such as expanded infrastructure, new developments, and potentially higher construction traffic. All these factors contribute to a higher overall traffic volume.
- 12.3.19 The Project's future traffic has been aligned to the latest forecasts Project Horizon Traffic Forecasts V6.0, July 2025<sup>2</sup>. Under the Base Case<sup>7</sup>, ALA is expected to handle approximately 12.0 million passengers and 83,115 annual air traffic movements (ATMs) in 2025, increasing to 16 million and 109,710 movements by 2030, 22.3 million and 149,023 movements by 2040, and 28 million and 188,425 movements by 2050. These forecasts also consider that an increasing number of passengers will be transfer or transit passengers, which is about 1.2 million by 2030 and up to 20% of total traffic by 2055 that does not leave the airport and therefore does not generate road trips. This means the growth in road traffic will be slower than the overall passenger growth. Accordingly, Mailin Street traffic estimates have been calculated based on several assumptions.
- 12.3.20 The starting point for the analysis was the 2021 traffic survey, which recorded 44,500 vehicles per day on Mailin Street, with approximately 40% of this traffic attributed to airport activity and 60% classified as local traffic.
- 12.3.21 Local traffic was assumed to remain constant at around 26,700 (60% of 44,500 local traffic) vehicles per day because no major new developments are expected along this corridor. The airport-related component, approximately 17,800 (40% of 44,500 airport related traffic) vehicles per day in 2021, was scaled in proportion to the growth in origin/destination passengers rather than total passengers. This adjustment accounts for the increasing share of transfer and transit passengers, who do not leave the airport and therefore do not generate road trips. For example, in 2030 the total passenger forecast is 16 million, of which about 1.2 million are expected to be transfer or transit passengers, resulting in an origin/destination passenger base of approximately 14.8 million, which is an increase of about 19% compared to the 2025 baseline of 12 million.

<sup>7</sup> The Base Case assumes steady economic growth and timely fleet deliveries. The Low Case reflects a downside scenario with slower GDP growth, delayed aircraft deliveries, and later easing of Russian airspace restrictions. Under the Low Case, passenger volumes in 2050 are approximately 12% lower than the Base Case, which would proportionally reduce airport-related road traffic. However, even under this scenario, Mailin Street volumes remain significantly above current levels, and congestion risks persist without mitigation.

- 12.3.22 Applying similar methodology and growth factors to the airport-related traffic gives an estimated 21,400 vehicles per day in 2030, which, when added to the constant local traffic, results in a total of approximately 48,000 vehicles per day. Similar calculations for 2040 and 2050 respectively, produce estimated totals of about 54,000 and 60,000 vehicles per day.
- 12.3.23 To reflect seasonal peaks observed in barrier entry data, these figures were conservatively adjusted upward to produce the indicative values, which are approximately 52,000 vehicles per day in 2030, 58,500 in 2040, and 65,000 in 2050, reported in Table 12.2.
- 12.3.24 In addition, the airport's car park capacity is an issue where ALA expects a shortage of at least 2,500 parking spaces as passenger traffic reaches approximately 19M. The Airport's Landside development plan in the context of Project Horizon foresees car park capacity to be expanded from the current 1,400 to 3,000 spaces in four years. It is to be noted that the second line of the Almaty Metro (Figure 12.6), to connect Zhibek-Zholy station to Almaty International Airport, is highlighted in the city's Master Plan to 2040 as a major infrastructure project aimed at improving urban mobility and airport accessibility. The core aim is to reduce private car usage by 20% and increase public transport usage by 60%. This new line would be expected to significantly reduce road congestion, especially along key access routes such as Zakarpatskaya, Ogaryov, and Mailin Streets, which are currently under pressure due to existing traffic levels.

**Figure 12.6: Almaty metro line and stations**



## 12.4 Potential impacts

- 12.4.1 The following potential impacts on land traffic have been identified as a result of the proposed airport expansion:

### Construction

- Increased traffic due to construction activities

- Increased vehicular traffic volumes on access roads
- Higher freight and logistics traffic, especially related to the new cargo apron, warehouses, and fuel farm expansion
- Potential conflicts between construction traffic and regular airport operations, including emergency access
- Temporary road closures and detours during construction, affecting internal circulation and external connectivity
- Quality of the roads
  - Increased pressure on existing road infrastructure, including access roads, intersections, and parking facilities, which may exceed their current design capacity if upgrades to roads, signage, and traffic control systems are not implemented in parallel
- Road safety
  - Congestion at key intersections and terminal access points, particularly during peak hours
  - Safety risks to pedestrians and road users, particularly in areas with mixed traffic or construction activity
- Nuisance
  - Air quality and noise impacts from increased traffic volumes and construction vehicle movements
  - Disruption to public transport services and shuttle operations during construction and peak operational periods

## Operation

- HGV road movements
  - Potential congestion and safety risks at intersections not designed for high-volume freight traffic
- Passenger movements
  - Increased passenger vehicle traffic
  - Greater demand for drop-off/pick-up zones and short-term parking, especially during peak travel periods
  - Pressure on local roads from parking related to the pickup and drop off from passengers
- Pressure on public transport services and shuttle operations, requiring capacity upgrades and improved scheduling
- Nuisance
  - Air quality and noise impacts from increased traffic volumes

## 12.5 Assessment of effects

12.5.1 The effects of the Project activities during both the construction and the operational phases are discussed in this section. It should be noted that, as traffic count data defining the baseline conditions, except the entrance gate traffic count, as well as traffic modelling for the construction and operational phases are not available, the assessment of impacts relies on the baseline data provided by ALA and the estimations made by expert judgement.

## Construction phase effects

### Increased traffic due to construction activities

- 12.5.2 There are a number of construction activities that could potentially impact the traffic conditions within and in the vicinity of the Project. The construction activities and the associated traffic generation levels are reviewed in the following section.
- 12.5.3 Construction access will be controlled through designated gates and construction vehicles are anticipated to utilise the internal access road situated in the boundaries of airport, avoiding residential streets where possible to minimise impacts on local communities. Nevertheless, neighbourhoods such as Amresek, Guldala, and Panfilovo, which are situated near key airport gates and access routes, may still experience increased traffic pressure during peak construction periods. These areas are particularly sensitive due to their proximity to the airport and existing congestion patterns and will require close monitoring and mitigation planning throughout the construction phase.
- 12.5.4 A variety of construction materials will be delivered to the site or taken from the site during the construction period, including:
- Excavated materials being transported within the site
  - Materials for construction of infrastructure including site roads, vehicle parking, and walkways
  - Steel, concrete, building materials, piping and other specific equipment
- 12.5.5 In addition, construction workers of one of the EPCs (YDA) are anticipated to be accommodated within an accommodation camp approximately 10km from the airport. Construction workers will travel to site via shared minibuses or public transport. Welfare facilities will be provided on site. No additional detailed information is expected from the remaining EPC contractors during the preparation of this ESIA. Consequently, data gaps – particularly in construction-related traffic volumes – have been identified. EPC contractors will be required to integrate actions to address these gaps into their respective Traffic Management Plans (TMPs), including the traffic estimates of construction staff, mitigation measures, and coordination with local authorities to minimise impacts on surrounding communities.
- 12.5.6 As reported by ALA, local suppliers and products are planned to be used for concrete supply, reinforcement steel, structural steel, etc. and to the extent possible for the other architectural, electrical, and mechanical installations.
- 12.5.7 The sourcing of construction materials for the Project involves a combination of local and long-distance suppliers. While some materials are produced on-site or within close proximity, others must be transported from locations hundreds or even thousands of kilometres away. The Project's location can act as a traffic bottleneck, especially where access roads converge near terminal gates. This effect tends to dissipate with distance, meaning that the magnitude of traffic-related impacts is highest closest to the airport.
- 12.5.8 Several key materials, such as natural aggregate and dowel bars, are sourced from within 20–50km of the project site. These include quarries and suppliers located in the Almaty Region and the city of Almaty itself. The short haul distances reduce the risk of prolonged traffic congestion and allow for more flexible delivery scheduling. However, even these local routes may experience increased traffic pressure, particularly along arterial roads such as Zakarpatskaya and Ogaryov Streets, which are already identified as subject to traffic congestion.
- 12.5.9 In contrast, materials such as cement and bitumen are sourced from much greater distances. Cement suppliers in Shymkent and Semey are located 699km and 1,122km away, respectively, while bitumen suppliers in Pavlodar and Atyrau are as far as 1,542km and 2,953km from the



site. The transport of these materials will require sustained use of national highways and regional roads, increasing the volume of heavy vehicle traffic over long durations. This raises concerns about road wear, accident risk, and emissions, particularly through populated or environmentally sensitive areas.

- 12.5.10 Overall, while the proximity of some suppliers supports efficient and low-impact logistics, the inclusion of distant sources for critical materials necessitates a robust traffic management strategy. This should include route planning, delivery time restrictions, vehicle maintenance protocols, and community engagement to minimise the environmental and social impacts of construction-related transport.
- 12.5.11 The construction traffic outside the Airport area will be mainly due to bulk supply trucks, which will create traffic movements within the first half of the construction programme, within which the movement will progressively increase. At the end of the first half, the construction related traffic is anticipated to start diminishing. Although the exact numbers are not available at this stage, considering the temporary and limited nature of planned construction traffic outside the airport boundary, the magnitude of additional movements is considered as **moderate**. Construction vehicles will travel within the speed limits and adhere to the traffic rules. The sensitivity of the local traffic is considered to be **medium**. Applying the significance criteria concludes the effect of construction movements associated with the Project on the capacity of the local road network around the Project is **moderate adverse (significant)**.

#### Quality of the roads

- 12.5.12 With respect to the physical effects of construction traffic, it is considered that trucks will have an impact of **moderate** magnitude on the local road infrastructure. Note that this assessment assumes that construction-related HGVs will primarily use designated and appropriate roads that are capable of accommodating such loads. The sensitivity of the local road network to truck movements is considered to be **medium** due to poor quality<sup>8</sup>. The use of HGVs on the road network has a potential to contribute to deterioration of the roads. However, overall, the effect of construction traffic on the quality of the roads is therefore assessed to be **moderate adverse (significant)**.
- 12.5.13 If less suitable roads are used, the magnitude of impact could be higher, and additional mitigation measures may be necessary. This highlights the importance of route planning and enforcement within the TMP to minimise adverse effects and ensure road safety.

#### Road safety

- 12.5.14 The exact number of additional vehicles during the construction phase is not known. However, as a substantial amount of these vehicles will be HGVs, the magnitude of the impact of the increase in numbers related to road safety is assessed as being **major**. The sensitivity of receptors (i.e., mainly the other road users) along the proposed construction transport routes, which will be mainly the isolated highway and major roads, is considered to be **medium** as it is not expected to have users such as pedestrians. The effect of construction traffic on road safety is therefore assessed to be **major adverse (significant)**.

#### Nuisance

- 12.5.15 The additional HGV road movements as a result of construction activities and operation of plant and heavy machinery have the potential to have a **moderate** impact on sensitive receptors. However, as discussed above, the main traffic movements outside the Project site will be mainly

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<sup>8</sup> Road conditions have been assessed through Google Street View images dated March 2023.

through highway and major roads, therefore the sensitivity is identified as **medium**. On this basis, the effect is considered to be **moderate adverse (significant)**.

## Operational phase effects

### HGV road movements and road safety

- 12.5.16 Additional traffic load on the existing road network during the operational phase is anticipated to be lower than those associated with construction of the Project in terms of construction vehicles, such as trucks, as well as vehicles for the supply of materials and goods. Following the completion of the Project, regular truck movements to and from the Airport will be limited to the weekly collection of various solid wastes and delivery of materials. In addition, occasional deliveries of materials will be made for maintenance purposes.
- 12.5.17 As part of the Project, additional capacity for passengers and cargo will be created. As such, the volume of waste from the catering and hospitality of workers and passengers, packaging waste, and waste generated from maintenance and cleaning will be increased.
- 12.5.18 The additional movements created by the freight and waste transportation, as set out in paragraph 12.3.12 could have an impact on traffic and congestion including:
- Impacts related to any improper management of internal traffic flow (i.e. circulation routes for pedestrian, visitors/personnel cars/shuttles, logistics)
  - Impacts related to traffic load increases on local roads
  - Impacts related to increased risk of traffic-related accidents or injuries on the transportation route
- 12.5.19 Rise in vehicle activity may elevate the risk of traffic-related accidents or injuries along transportation routes, particularly if road safety measures are not adequately implemented. Therefore, careful planning and monitoring of traffic patterns, along with the integration of road safety protocols, will be essential to mitigate these risks during the operational phase.

### Passenger movements

- 12.5.20 Operational traffic will be mostly due to passenger movements including the use of private cars, shuttle buses and taxis. As the airport is an operational airport, the types of vehicles are not expected to vary with the completion of the Project. During the site visit, it was noted that passenger traffic at ALA nearly doubled between 2021 and 2024. This sharp increase reflects a strong upward trend in airport usage, which is expected to continue in the coming decades. Considering the forecasts for the increase in the passenger numbers in the following years, the traffic volumes are expected to increase. Table 12.2 shows assumed traffic volumes relating to the Project's operation.

**Table 12.2: Assumed traffic data for 2030, 2040, and 2050**

| Year | Projected Passengers (millions) | Annual ATMs (avg)   | Mailin Street total (veh/day) – indicative |
|------|---------------------------------|---------------------|--------------------------------------------|
| 2030 | 16                              | 109,710 (228 daily) | 52,000                                     |
| 2040 | 22.3                            | 149,023 (301 daily) | 58,500                                     |
| 2050 | 28                              | 188,425 (516 daily) | 65,000                                     |

- 12.5.21 Since the design of the Project is taking into consideration the expected increase in passenger numbers in particular during the design of car park areas, the overall effect of operational traffic inside the airport is expected to be **insignificant** in terms of the capacity of the internal road network and parking spaces. However, the surrounding road network—particularly in neighbourhoods such as Amresek, Guldala, and Panfilovo—is already experiencing congestion.

In the absence of mitigation measures such as improvements to local road capacity and public transport infrastructure, the magnitude of impact of additional traffic movements (including both truck and passenger vehicles) is considered to be **high**. Given the **medium to high** sensitivity of the affected areas, the resulting effect is assessed as **major adverse** (significant).

## 12.6 Mitigation

### Construction phase

- 12.6.1 A range of measures are proposed to mitigate the adverse effects of traffic movements associated with construction of the Project, including both physical and management measures. The following specific mitigation measures will be applied during the construction phase of the Project.
- 12.6.2 General traffic management for increased traffic and quality of roads:
- A construction TMP will be developed by the EPC Contractor. The plan will cover a detailed set of control and mitigation measures. With the mitigation measures proposed in this chapter, the traffic management will be enhanced.
  - The TMP provides a guide for the type of measures needed to mitigate the impact of construction traffic movements on the local road and highway network and on the local communities as well as to enhance the efficient transport of supplies and materials to the Project site, while minimising congestion and disruption.
  - The TMP will also outline procedures for managing suppliers and delivery drivers arriving at the site, including advance notification requirements. All suppliers will be informed of the site's safety requirements, in particular those related to airside operations, prior to arrival. This will ensure that only vehicles and personnel meeting the necessary safety standards are granted access to the project site.
  - The Contractor will comply with the national regulations and ensure that the construction site is properly secured, and construction related traffic regulated.
  - Complaint venues including phone numbers will be placed on the back of all trucks and construction vehicles of the EPC Contractor and sub-contractors.
  - The TMP will include the grievance procedure on speeding and other construction traffic related risks to communities.
  - Traffic and transport management will be carefully planned and performed considering potential developments in the vicinity of the Project. Hence, the likely congestion and traffic accidents should be prevented (peak and off-peak hours).
  - All vehicles will enter and exit the Project site in a forward direction. Vehicle manoeuvring will not be allowed on public roads.
  - Earth material haulage will be restricted during peak traffic periods to minimise congestion.
- 12.6.3 Road safety:
- The TMP will define sensitive receptors, such as schools, on the access routes to the airport. Relevant mitigation measures including regular consultation with school administration, training of drivers with respect to the needs of the sensitive receptors will be identified in the TMP.
  - Due attention will be paid to rush hour extremes and evolving traffic conditions when planning traffic management interventions.
  - Good site visibility will be ensured in order not to allow drivers' lines of sight to be obstructed by structures.

- Disruption to road users will be minimised as far as possible by utilising the designated areas for the storage of materials and by providing onsite parking to reduce congestion on the road during materials delivery.
- Ongoing consultations will be undertaken with stakeholders (especially with neighbouring facilities and district representatives) to inform them about the construction program and transportation routes.

12.6.4 Nuisance:

- Dust suppression techniques on unpaved roads will be implemented such as applying water or non-toxic chemicals to minimise dust from vehicle movements. Where water is used for dust suppression, processes require an adequate supply of water.
- Air quality and noise related mitigation measures are outlined in **ESIA Chapter 5: Air quality** and **ESIA Chapter 11: Noise**.

12.6.5 Traffic impacts during construction will peak between 2026 and 2027, when Phase 1 and Phase 2 activities overlap. These phases include major works such as the full depth reconstruction of the runway, taxiway construction, and apron upgrades, which will generate the highest volume of HGV movements and worker transport. To manage this, TMP will include strict controls on delivery schedules, designated routes, and time windows to avoid peak commuter periods. Coordination with local authorities will be essential to prevent congestion on Mailin Street and surrounding residential areas.

12.6.6 The TMP will incorporate all mitigation measures outlined in this chapter. In addition, the TMP will specify the roles and responsibilities of designated personnel tasked with implementing and monitoring the plan. Key Performance Indicators (KPIs) will be assigned to these individuals to ensure accountability and to track the effectiveness of traffic control measures throughout the construction phase. This approach will support proactive traffic management and ensure that the TMP remains responsive to evolving site conditions and community concerns.

## Operational phase

12.6.7 The following mitigation measures will be applied during the operational phase of the Project.

12.6.8 General traffic management for increased traffic due to HGV and passenger movements:

- A TMP will be developed for the operational phase outlining safety measures for traffic management including vehicle operations, use of access roads, vehicle and pedestrian routes, and use of parking facilities. KPIs will be assigned to these individuals to ensure accountability and to track the effectiveness of traffic control measures throughout the operational phase. This approach will support proactive traffic management and ensure that the TMP remains responsive to evolving site conditions and community concerns.
- The TMP will guide the measures needed to mitigate the impact of construction traffic on the local road and highway network and surrounding communities, while facilitating the efficient transport of supplies and materials to the Project site and minimizing disruption. It will also outline procedures for managing suppliers and delivery drivers, including advance notification protocols to ensure compliance with site-specific safety requirements, especially those related to airside operations.
- It will be ensured by ALA that traffic and transport procedures within the airport follow the applicable national and international standards and guidelines.
- The responsible personnel for emergency related actions at ALA will be furnished and trained to respond to traffic related emergencies. Traffic related emergencies will be part of the emergency response plan.
- As currently no information is available on the capacity of the airport shuttle buses, it is important that communication with the relevant authority is held by ALA to discuss and align

with necessary future upgrades of shuttle bus services to satisfy the demand as a result of airport expansion and related passenger increase.

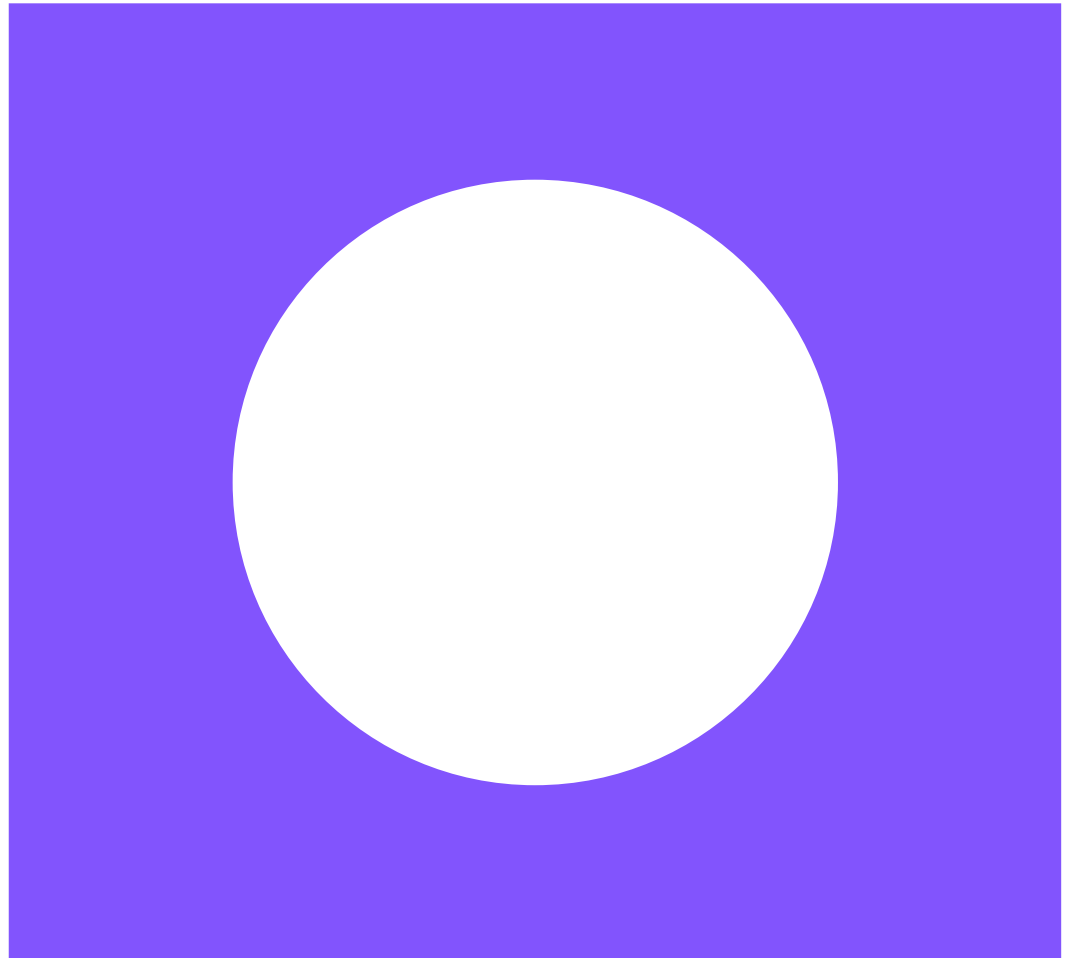
- Monitoring of airport traffic increases and impacts on the local road network will be undertaken. ALA will prepare a monitoring plan which will identify access roads on which traffic counts will be periodically undertaken to better understand future impacts from capacity increases.
- Bus and shuttle services will be expanded in line with forecast passenger growth, ensuring sufficient capacity during peak flight banks. Special attention will be required for night-time operations after 2027, when the easing of Russian airspace restrictions is expected to re-cluster night arrivals, potentially increasing demand for late-night ground transport.
- Lower speed limits and traffic control measures will be applied within the Project.
- The airport will introduce dynamic pricing for short-stay parking, require pre-booking during peak periods, and implement time windows for commercial vehicles to reduce congestion at terminal access points.
- The airport will collaborate with city authorities and digital map providers to de-prioritize residential shortcuts (such as routes through Almerék and Guldala) in navigation apps and introduce local traffic filters to protect communities from airport-related through-traffic.
- A safe working environment for drivers and the transportation of ALA staff as well as staff of its service providers commuting to the airport and the supply of necessary Personal Protective Equipment (PPE) will be ensured.
- Necessary communication and collaboration with local/governmental authority, non-governmental organisations (NGOs), neighbouring facilities and commercial organisations regarding traffic and transport management will be undertaken.
- While a Surface Access Strategy is not a legal requirement in Kazakhstan, nor a strict condition imposed by lenders, it is increasingly recognized as international good practice. Based on Project Horizon's growth estimates, such a strategy is recommended to help inform more effective mitigation measures, improve connectivity, and support long-term sustainability planning.
- These measures, combined with the planned metro connection and improvements to the regional road network, as well as the recommended Surface Access Strategy, will help mitigate congestion risks and ensure safe, efficient access to the airport as traffic volumes increase.

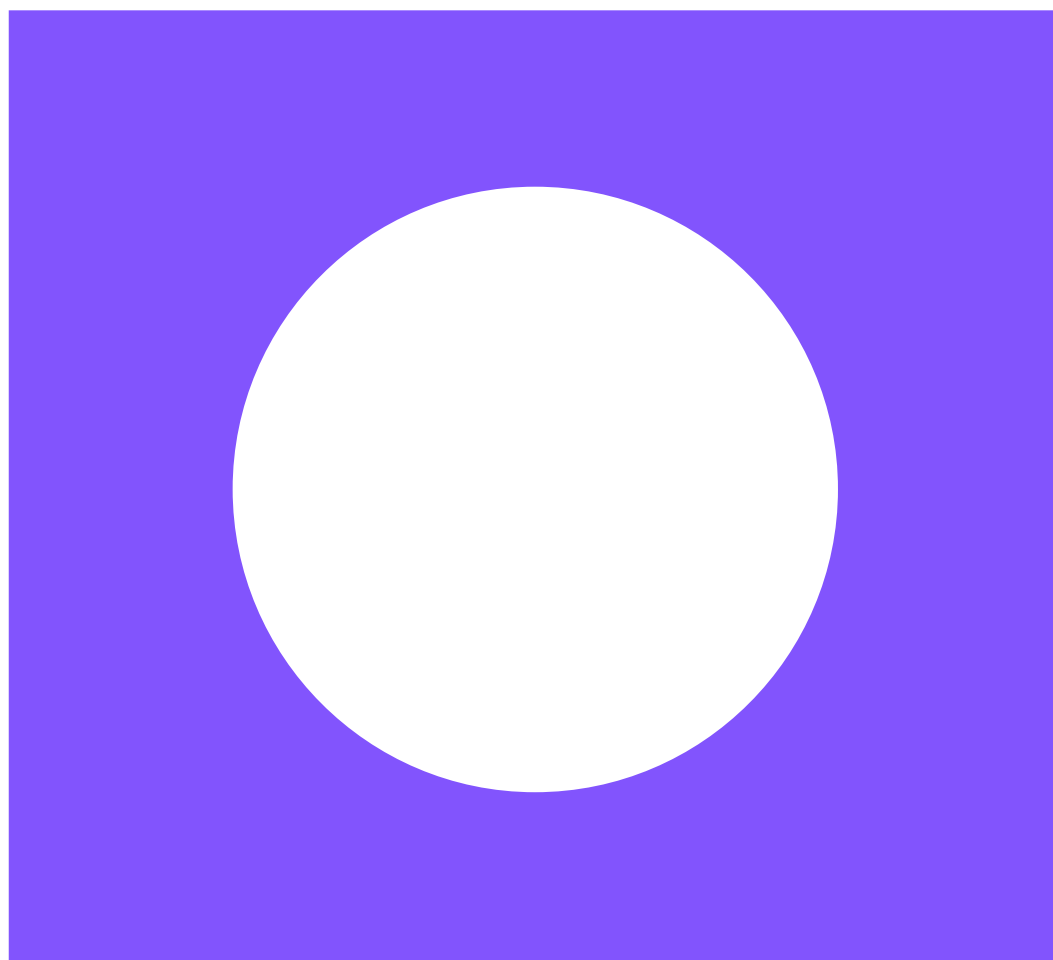
## 12.7 Summary of residual effects

12.7.1 Residual effects after the application of mitigation are presented in Table 12.3.

**Table 12.3: Summary of residual effects for traffic and transport**

| Description of effect                            | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                         | Residual effect                 | Proposed monitoring                                                                                                                                                       |
|--------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Construction phase                               |                        |                         |                     |                                                     |                                                                                                                                                                                                                                               |                                 |                                                                                                                                                                           |
| Increased traffic due to construction activities | Temporary              | Medium                  | Moderate            | Moderate adverse (Significant)                      | EPCs to prepare Construction TMP                                                                                                                                                                                                              | Negligible (Not significant)    | Ongoing consultations with stakeholders to monitor or address any complaints related with traffic and transport                                                           |
| Quality of the roads                             | Permanent              | Medium                  | Moderate            | Moderate adverse (Significant)                      | EPCs to prepare Construction TMP                                                                                                                                                                                                              | Negligible (Not significant)    | ALA to monitor EPCs performance via well-defined KPIs in the EPCs' construction TMP.                                                                                      |
| Road safety                                      | Temporary              | Medium                  | Major               | Major adverse (Significant)                         | EPCs to prepare Construction TMP                                                                                                                                                                                                              | Minor adverse (Not significant) |                                                                                                                                                                           |
| Nuisance                                         | Temporary              | Medium                  | Moderate            | Moderate adverse (Significant)                      | EPCs to prepare Construction TMP                                                                                                                                                                                                              | Negligible (Not significant)    |                                                                                                                                                                           |
| Operational phase                                |                        |                         |                     |                                                     |                                                                                                                                                                                                                                               |                                 |                                                                                                                                                                           |
| HGV and Passenger Movements                      | Permanent              | Medium                  | Major               | Major adverse (Significant)                         | ALA to prepare operational TMP. A Surface Access Strategy (SAS) is recommended based on Project Horizon's growth estimates to inform more effective mitigation measures, improve connectivity, and support long-term sustainability planning. | Minor adverse (Not significant) | Monitoring of airport traffic increases and impacts on local road network. Periodic review of access modes and connectivity options to support future updates to the SAS. |





# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 13

September 2025



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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 13**

September 2025

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| Revision | Date       | Originator | Checker | Approver | Description                                |
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# Contents

|                                           |    |
|-------------------------------------------|----|
| Acronyms and abbreviations                | 1  |
| 13 Waste and resources                    | 2  |
| 13.1 Introduction                         | 2  |
| 13.2 Methodology                          | 2  |
| Applicable guidelines and standards       | 2  |
| Area of Influence for waste and resources | 4  |
| Methodological approach                   | 4  |
| Limitations and assumptions               | 7  |
| 13.3 Baseline                             | 10 |
| Current baseline                          | 10 |
| Future baseline                           | 12 |
| 13.4 Potential impacts                    | 12 |
| 13.5 Assessment of effects                | 13 |
| Construction phase effects                | 13 |
| Operational phase effects                 | 16 |
| 13.6 Mitigation                           | 18 |
| Construction phase mitigation             | 19 |
| Operational phase mitigation              | 22 |
| 13.7 Summary of residual effects          | 23 |
| Appendix 13.A: Site photos                | 30 |

## Tables

|                                                                                                                           |    |
|---------------------------------------------------------------------------------------------------------------------------|----|
| Table 13.1: Receptor sensitivity criteria for landfill void capacity (IEMA, 2020)                                         | 5  |
| Table 13.2: Magnitude of adverse Impact criteria for landfill void capacity (IEMA, 2020)                                  | 6  |
| Table 13.3: Effect threshold                                                                                              | 6  |
| Table 13.4: Weight of non-hazardous waste reported in 2024 and treatment/disposal destination                             | 10 |
| Table 13.5: Weight of hazardous waste reported in 2024 and treatment/disposal destination                                 | 11 |
| Table 13.6: Excavation and demolition waste reuse/ disposal from the Project                                              | 13 |
| Table 13.7: Waste type and potential treatment                                                                            | 13 |
| Table 13.8: The treatment/disposal method and facility location where applicable for construction waste streams           | 14 |
| Table 13.9: Material used in the construction phase that has the potential to become waste                                | 14 |
| Table 13.10: Summary of significance assessment of potential unmitigated impacts that may occur in the construction phase | 16 |
| Table 13.11: Expected passengers, waste generated, and landfill diversion rates through the operational phase             | 17 |

|                                                                                                                          |    |
|--------------------------------------------------------------------------------------------------------------------------|----|
| Table 13.12: Summary of significance assessment of potential unmitigated impacts that may occur in the operational phase | 18 |
| Table 13.13: Summary of residual effects for waste and resources                                                         | 24 |

## Figures

|                                                                                                                                                        |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 13.1: Calculated total non-hazardous waste generated (excluding construction wastes) per year from 2030 to 2050 after completion of the Project | 17 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|----|

# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                                                                                                             |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| ALA                    | Almaty International Airport                                                                                                           |
| AoI                    | Area of Influence                                                                                                                      |
| C-ESMP                 | Construction Environmental and Social Management Plan                                                                                  |
| BPEO                   | Best Practicable Environmental Option                                                                                                  |
| ESMP                   | Environmental and Social Management Plan                                                                                               |
| EBRD                   | European Bank for Reconstruction and Development                                                                                       |
| EHS                    | Environmental, Health, and Safety                                                                                                      |
| EPC Contractor         | Engineering, Procurement, and Construction Contractor                                                                                  |
| EPRP                   | Emergency Preparedness and Response Plan                                                                                               |
| ESIA                   | Environmental and Social Impact Assessment                                                                                             |
| GIIP                   | Good International Industry Practice                                                                                                   |
| IEMA (ISEP)            | Institute of Environmental Management and Assessment (recently renamed as Institute of Sustainability and Environmental Professionals) |
| IFC                    | International Finance Corporation                                                                                                      |
| PAA                    | Project Affected Area                                                                                                                  |
| PPE                    | Personal Protective Equipment                                                                                                          |
| WMP                    | Waste Management Plan                                                                                                                  |

# 13 Waste and resources

## 13.1 Introduction

- 13.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) reports the findings of an assessment of the likely significant environmental effects on waste and resources as a result of the Project.
- 13.1.2 An assessment of likely significant effects has been undertaken for each of the sensitive receptors identified in the study area. Where necessary, commitments to mitigation measures have been made to manage any impacts on receptors.
- 13.1.3 The (mis)handling of waste and resources through the construction and operational phase of the Project has the potential to have a major adverse effect on environmental and human receptors as well as being likely to reduce the void capacity of landfills in Almaty.
- 13.1.4 The types and amount of waste expected to be generated in the construction and operational phase are presented in this ESIA. Suggested mitigations based on professional judgement are also put forward. To mitigate the identified impacts, implementation of appropriate management, storage and disposal measures is essential. It is recommended that waste be handled in a manner that complies with Good International Industry Practice (GIIP) and legislative requirements, where practicable. It is also recommended that waste be managed, where practicable, in accordance with the waste hierarchy whereby the following actions will be prioritised in order:
1. Reduce the volume of waste generated
  2. Reuse material where possible
  3. Recycle unavoidable waste
  4. Otherwise recover material/energy from the waste (e.g. anaerobic digestion, incineration with energy recovery)
  5. Only dispose of waste (e.g. through landfilling or incineration without energy recovery) as a last resort

## 13.2 Methodology

### Applicable guidelines and standards

- 13.2.1 In addition to those mentioned in **ESIA Chapter 3: Policy, legal and institutional framework**, the ESIA in relation to waste and resources will follow the following local and international legislation and best practice guidelines.

### Kazakhstani legislation

- **The Environmental Code of the Republic of Kazakhstan (Code No. 400-VI ZRK of 2021)** – Establishes a waste management system that classifies waste by hazard, mandates extended producer responsibility, regulates landfill operations, and sets ambitious recycling targets to support the country's green economy transition.

- **New National Waste Management strategy (to be finalised in September 2025<sup>1</sup>)** – Will outline a more holistic approach to waste management.
- **ҚР ДСМ 331/2020 Sanitary Rules for the Collection, Use, Application, Disposal, Transportation, Storage and Burial of Production and Consumption Waste** – Sets sanitary and epidemiological requirements for the handling of domestic and industrial waste.
- **Order № 314 On approval of the Waste Classifier (2021)** – establishes a standardised system for categorising waste types based on their composition and hazard level, in alignment with the Environmental Code to support effective waste management and regulatory oversight.

### International guidance

- **International Finance Corporation (IFC) Performance Standard 3 on Resource Efficiency and Pollution Prevention (2012)<sup>2</sup>** – Stipulates that hazardous and non-hazardous waste materials need to be avoided or minimised where possible. If avoidance of waste generation cannot be done but was minimised instead, waste must be recovered and reused. The Project must treat, destroy and dispose of waste including hazardous waste that cannot be recovered or reused in an environmentally sound manner. When waste management is handled by third parties, the Engineering, Procurement, and Construction (EPC) Contractors used will be of good reputation and enterprises that are legitimate and licensed by the relevant regulatory agencies.
- **The Basel Convention<sup>3</sup>** – Lays out limitations to the transboundary movement of hazardous wastes.
- **IFC General Environmental, Health, and Safety (EHS) Guidelines for Waste Management (2007a)<sup>4</sup>** – Provides recommendations on hazardous and non-hazardous waste management and their disposal. These guidelines provide advice on creating and following a Waste Management Plan (WMP) which will include procedures for preventing waste, minimising waste, a plan to separate different types of waste, the proper storage, transportation and disposal of all wastes produced during the construction and operation of the Project.
- **IFC Environmental, Health, and Safety Guidelines for Waste Management Facilities (2007b)<sup>5</sup>** – Provides recommendations on hazardous and non-hazardous waste management, much of which is applicable to any site where waste is stored or handled.
- **IFC performance Standards on Social and Environmental Sustainability (2006)<sup>6</sup> (updated in 2012)<sup>7</sup>** – Sets out how waste and hazardous waste should be managed with respect to human and environmental safety with the goal of sustainability.

<sup>1</sup> The Astana Times (2025) Kazakhstan to Tackle Gaps in Waste Management with Strategy Due by September Available at: [Kazakhstan to Tackle Gaps in Waste Management with Strategy Due by September - The Astana Times](#) Last accessed on 18/07/2025

<sup>2</sup> IFC (2012) Performance Standard 3 on Resource Efficiency and Pollution Prevention Available at: [Performance Standard 3: Resource Efficiency and Pollution Prevention | International Finance Corporation \(IFC\)](#) Last accessed on 11/8/2025

<sup>3</sup> Basel Convention on the Control of Transboundary Movements of Hazardous wastes and their Disposal & Basel Protocol on Liability and Compensation (2023). Available at <https://www.basel.int/Portals/4/download.aspx?e=UNEP-CHW-IMPL-CONVTEXT-2023.English.pdf> Last accessed on 09/7/2025

<sup>4</sup> IFC (2007a). General Environmental, Health, and Safety Guidelines for Waste Management Available at: [Final - General EHS Guidelines APRIL 29.doc](#) Last accessed on 09/7/2025

<sup>5</sup> IFC (2007b). Environmental, Health, and Safety Guidelines for Waste Management Facilities

<sup>6</sup> IFC (2006). Performance Standards on Social and Environmental Sustainability

<sup>7</sup> IFC (2012). Performance Standards on Social and Environmental Sustainability



- **IFC Guidance Note 1 on the Assessment and Management of Environmental and Social Risks and Impacts (2012)**<sup>8</sup> – Outlines how an assessment of environmental and social risks should be conducted.
- **Institute of Environmental Management and Assessment (IEMA) guide to: Materials and Waste in Environmental Impact Assessment (2020)**<sup>9</sup>. – Outlines how waste and resources should be considered in an Environmental Impact Assessment and provides guidance on the impact assessment for waste generation on landfill void capacity.
- **European bank for reconstruction and development (EBRD) Environmental and Social Policy (2024)**<sup>10</sup> – Outlines how resources and waste should be efficiently and sustainably used and disposed of in accordance with the waste hierarchy as well as the safe handling and transport of hazardous waste.

### Area of Influence for waste and resources

13.2.2 In accordance with IEMA guidance and professional judgement, this assessment uses two geographically different study areas to examine the generation and management of waste, management of material and their storage:

- The Project Affected Area (PAA) defined as the area of land used by the Project permanently or temporarily. This includes the Project footprint (the red line boundary or limits of deviation), and any areas required for temporary access, site compounds, working platforms and other enabling activities.
- The Area of Influence (AoI) is primarily focused within 50km of the Project site as well as any other adjacent areas, where wastes from the Project are to be transported for processing or for final disposal. This area should be sufficient to identify suitable material and waste management infrastructure and disposal sites, within a defined region that could accept arisings of materials or waste generated by the construction and operation of the airport.

### Methodological approach

13.2.3 The assessment of impacts from waste and resource (mis)management has been conducted based on available Project information and a desk-based review of provided and publicly accessible information regarding waste management. The ESIA methodology for the management of material and solid waste for the construction and operational phases has been based on two different sets of criteria:

- Mismanagement of material and waste
- The IEMA guidelines on landfill void capacity

13.2.4 The ESIA will be based on relevant legislation and will:

- Review key activities for the construction and operational phases for the generation of waste and material handling.
- Identify key waste streams and material used during the construction and operational phases.
- Identify areas of key concern due to their environmental and social significance.
- Estimate and quantify waste streams where possible.
- Identify suitable waste management procedures including review and implementation of suitable waste management hierarchy.

---

<sup>8</sup> IFC (2012). Guidance Note 1: Assessment and Management of Environmental and Social Risks and Impacts

<sup>9</sup> IEMA (2020). Guide to: Materials and Waste in Environmental Impact Assessment

<sup>10</sup> EBRD (2024). Environmental and Social Policy

- Identify transportation requirements for waste disposal as a result of construction and operation of the Project.
- 13.2.5 A range of impacts can occur from the mismanagement of materials and waste arising from construction and operational activities. This impact assessment is primarily focused on identifying materials and waste streams and adopting an appropriate approach in line with GIIP, where practicable, which seeks to avoid the generation of waste in the first instance, rather than mitigating potential impacts to a defined baseline. Nevertheless, mitigation measures have been proposed within the ESIA report to minimise or avoid identified impacts.
- 13.2.6 Professional judgement will be used to provide an assessment of effects based on several factors, including:
- The type of storage and handling required for the materials and waste.
  - The type of waste generated, e.g. inert, non-hazardous, hazardous.
  - The availability of suitable facilities within close proximity to the Project to treat the waste generated.
  - Compatibility of the best practicable environmental option (BPEO) for the waste within the context of the waste hierarchy, i.e. whether generation of the waste can be minimised, the waste can be recycled, landfilled, etc.
- 13.2.7 The criteria used to assess the sensitivity of relevant receptors and magnitude of potential impacts for mismanagement of material and waste are outlined in Table 4.2 and Table 4.3 in **ESIA Chapter 4: ESIA scope and methodology**.
- 13.2.8 Potential impacts for mismanagement of material and waste are attributed significance, taking into account the interaction between the magnitude of an impact and the sensitivity of a receptor, as outlined in Table 4.4 in **ESIA Chapter 4: ESIA scope and methodology**.
- 13.2.9 The criteria used to assess the sensitivity of relevant receptors and magnitude of potential impacts on landfill void capacity based on IEMA guidelines are outlined in Table 13.1 and Table 13.2. These guidelines are designed to be used in the UK but have been used to support professional judgement for this Project.

**Table 13.1: Receptor sensitivity criteria for landfill void capacity (IEMA, 2020)**

| Sensitivity category | Description                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Negligible           | Across construction and/or operation phases, the baseline/future baseline of regional (or where justified, national) inert, non-hazardous, and hazardous landfill void capacities are expected to remain unchanged or are expected to increase through a committed change in capacity.                                                                                                                                                   |
| Low                  | Across construction and/or operation phases, the baseline/future baseline of regional (or where justified, national): <ul style="list-style-type: none"> <li>• Inert and non-hazardous landfill void capacity is expected to reduce minimally: by less than 1% as a result of wastes forecast.</li> <li>• Hazardous landfill void capacity is expected to reduce minimally: by less than 0.1% as a result of wastes forecast.</li> </ul> |
| Medium               | Across construction and/or operation phases, the baseline/future baseline of regional (or where justified, national): <ul style="list-style-type: none"> <li>• Inert and non-hazardous landfill void capacity is expected to reduce noticeably: by 1% – 5% as a result of wastes forecast.</li> <li>• Hazardous landfill void capacity is expected to reduce noticeably: by 0.1% – 0.5% as a result of wastes forecast.</li> </ul>       |
| High                 | Across construction and/or operation phases, the baseline/future baseline of regional (or where justified, national): <ul style="list-style-type: none"> <li>• Inert and non-hazardous landfill void capacity is expected to reduce considerably: by 6% – 10% as a result of wastes forecast.</li> </ul>                                                                                                                                 |

| Sensitivity category | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | <ul style="list-style-type: none"> <li>Hazardous landfill void capacity is expected to reduce considerably by: 0.5% – 1% as a result of wastes forecast.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Very high            | <p>Across construction and/or operation phases, the baseline/future baseline of regional (or where justified, national):</p> <ul style="list-style-type: none"> <li>Inert and non-hazardous landfill void capacity is expected to reduce very considerably (by greater than 10%); end during construction or operation; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand.</li> <li>Hazardous landfill void capacity is expected to reduce very considerably (by greater than 1%); end during construction or operation; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand.</li> </ul> |

Source: IEMA guide to: Materials and Waste in Environmental Impact Assessment (2020)

**Table 13.2: Magnitude of adverse Impact criteria for landfill void capacity (IEMA, 2020)**

| Magnitude category | Description                                                                                                                                                                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No change          | There is zero non-hazardous and hazardous waste generation and disposal from the Project.                                                                                                                                                                                                          |
| Negligible         | <p>The Project will reduce:</p> <ul style="list-style-type: none"> <li>Regional or, where justified, national landfill void capacity baseline** for inert and non-hazardous by less than 1%.</li> <li>National landfill void capacity baseline for hazardous waste** by less than 0.1%.</li> </ul> |
| Minor              | <p>The Project will reduce:</p> <ul style="list-style-type: none"> <li>Regional or, where justified, national landfill void capacity baseline** for inert and non-hazardous by 1% – 5%.</li> <li>National landfill void capacity baseline** for hazardous waste by 0.1% – 0.5%.</li> </ul>         |
| Moderate           | <p>The Project will reduce:</p> <ul style="list-style-type: none"> <li>Regional or, where justified, national landfill void capacity baseline** for inert and non-hazardous by 6% – 10%.</li> <li>National landfill void capacity baseline** for hazardous waste by 0.5% – 1%.</li> </ul>          |
| Major              | <p>The Project will reduce:</p> <ul style="list-style-type: none"> <li>Regional or, where justified, national landfill void capacity baseline** for inert and non-hazardous by greater than 10%.</li> <li>National landfill capacity baseline** for hazardous waste by greater than 1%.</li> </ul> |

Source: IEMA guide to: Materials and Waste in Environmental Impact Assessment (2020)

\*\* Estimated as the worst-case scenario, during a defined construction and/or operational phase.

- 13.2.10 Potential impacts on landfill void capacity are attributed significance, taking into account the interaction between the magnitude of an impact and the sensitivity of a receptor, as outlined in Table 13.3.

**Table 13.3: Effect threshold**

| Sensitivity (or value) of receptor | Magnitude of impact |            |            |            |            |
|------------------------------------|---------------------|------------|------------|------------|------------|
|                                    | No change           | Negligible | Minor      | Moderate   | Major      |
| Very high                          | Neutral             | Negligible | Moderate   | Major      | Major      |
| High                               | Neutral             | Negligible | Minor      | Moderate   | Major      |
| Medium                             | Neutral             | Negligible | Negligible | Minor      | Moderate   |
| Low                                | Neutral             | Negligible | Negligible | Negligible | Minor      |
| Negligible                         | Neutral             | Neutral    | Negligible | Negligible | Negligible |

Source: IEMA guide to: Materials and Waste in Environmental Impact Assessment (2020)

## Limitations and assumptions

- 13.2.11 This section outlines all assumptions that have been made in this chapter as well as limitations of this study.

### Scope

- 13.2.12 This assessment has not considered the effects of land contamination (such as impact on groundwater) as this has been considered within **ESIA Chapter 9: Geology and soils**. Where potential impacts from contaminated land are identified, this chapter addresses the management of this waste or material only.
- 13.2.13 The availability of resources and impacts of resource consumption have not been explored here. This ESIA is focused on the generation and management of waste and reusable materials on site as well as resource consumption only in the context of waste reduction.

### Baseline

- 13.2.14 The information provided, at the time of preparing this Chapter, by ALA has been used to establish baseline characterisation. This baseline may evolve as more information and additional assessments become available.
- 13.2.15 The individual or legal entity responsible for handling the waste is identified in the ALA's Annual waste inventories report for 2024 (ALA, received June 2025). However, information regarding the final facility destination and whether this waste is recycled, treated or landfilled is not available in the report and therefore not provided in this ESIA.
- 13.2.16 It is assumed that available waste generation information from 2024 (ALA, received June 2025 Annual waste inventories report for 2024) is representative of operational waste generation in a typical year. These figures are broadly comparable to those presented in the Waste Management Programme (ALA, 2023 WMP 2023-2032). However, any irregularity in waste generation weight or composition that there is may affect estimates, limiting the accuracy of waste generation estimates.
- 13.2.17 Recycling rates at ALA are assumed to be comparable to those reported for Almaty city for 2019 (Government of the Republic of Kazakhstan, 2023<sup>11</sup>). It is assumed that the waste which is not recycled will be landfilled.

### Construction phase effects

- 13.2.18 The information provided at the time of preparing this chapter has been used to assess the likely effects of the construction phase of the Project. Any assessment of effects may evolve as more information and additional assessments become available.
- 13.2.19 Whilst materials to be used and wastes to be generated during the construction phase of the Project have been identified at a high level, with best available information, exact quantities of wastes and materials have not been defined and may be subject to change following detailed design.
- 13.2.20 Estimated construction waste volumes are based on the latest available information at the time of drafting this chapter (YDA SMS, received June 2025 Waste Volumes and Landfill).
- 13.2.21 An EPC Contractor has been appointed for these elements:

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<sup>11</sup> Government of the Republic of Kazakhstan (2023) Information on waste reduction, recycling and reuse Available at: [Information on waste reduction, recycling and reuse | Electronic government of the Republic of Kazakhstan](#) Last accessed on 11/07/2025

- Full depth reconstruction of main runway
- Construction of new taxiway
- Construction of a new cargo apron
- Full depth reconstruction of existing VIP apron
- Construction of a new de-icing pad
- Rehabilitation of parking stands

Section 13.5 takes into account these elements in quantitative analyses that were undertaken.

13.2.22 An EPC Contractor has not been appointed for:

- The fuel farm
- Catering facility
- Domestic terminal renovation
- Drainage and wastewater treatment
- New head office and training centre
- Aerodrome and ground handling village
- New landside and airside warehouses
- Other improvements

Section 13.5 does not quantitatively assess construction waste generated from these elements as insufficient information was available at the time of drafting this ESIA. Quantitative estimates of waste generated in the construction phase are likely to be underestimated as all construction elements are not accounted for. A qualitative assessment of the construction phase has also been conducted.

13.2.23 The expected waste composition of the construction waste presented is based on analysis of work for which a contractor has been already appointed and thus may not include other waste streams that may be generated.

13.2.24 It is also assumed that construction workers will generate municipal waste at a rate similar to passengers. Calculated municipal waste generation rates using data from 2024 has been used (ALA, received June 2025 Annual waste inventories report for 2024 year). This may be an underestimation as passengers are likely to spend less time at the airport than construction workers. A waste generation rate applicable for residents in Almaty (Vassilis et al., 2017<sup>12</sup>) is not used as construction workers are not housed on site.

13.2.25 Estimated municipal waste generation from construction is based on the latest available information at the time of drafting this chapter and is based on monthly estimates of construction workers (YDA SMS, received June 2025 Detailed Manpower Schedule and Histograms).

13.2.26 Estimates of municipal waste generated by construction workers are also likely to be underestimated as estimates are based only on elements for which EPC Contractors have been appointed.

13.2.27 Since the information regarding the recovery and diversion from landfill volumes or weights is unavailable, the impact assessment will be based on the likely composition of waste streams and reasonable assertions will be made about disposal. The lack of data on landfill void capacity and landfill diversion limits the assessment of environmental impacts for waste

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<sup>12</sup> Inglezakis, V.J., Moustakas, K., Khamitov, G., Tokmurzin, D., Rakhmatulina, R., Serik, B., Abikak, Y. and Pouloupoulos, S.G., 2017. Municipal solid waste management in Kazakhstan: Astana and Almaty case studies. Available at: <https://core.ac.uk/download/pdf/334954945.pdf> Last accessed on 11/07/2025

generation, based on guidance from IEMA for landfill void capacity, thus this assessment is based on professional judgement and based on other projects of similar size and nature.

### Operational phase effects

- 13.2.28 The information provided at the time of preparing this chapter has been used to assess the likely effects of the operational phase of the Project. ALA's operational WMP incorporates an adaptive management approach, allowing it to evolve throughout the Project's lifecycle in response to new information, operational changes, and regulatory requirements. Accordingly, the assessment of effects may be refined as more detailed data and additional assessments become available.
- 13.2.29 The types and quantities of materials required during the operational phase, as well as the waste expected to be generated, have been identified at a high level. This assessment is based on the current operation of the Project and informed by professional judgement and experience from similar projects, and is anticipated to remain broadly consistent.
- 13.2.30 Assumptions made about waste generation are based on the best available air traffic forecasting estimates: Mott MacDonald, August 2025 Project Horizon Traffic Forecasts Outputs (DRAFT V6.0). These are likely to differ from real passenger numbers in the future.
- 13.2.31 It is assumed that waste generation will increase linearly with passenger numbers. Estimated waste generation rates in the operational phase of the Project are based on an extrapolation of the waste generation rate (using the available 2024 data) per passenger. Waste generation shall be estimated for 2030, 2040, and 2050.
- 13.2.32 It is assumed that the waste generation rate will not change. Waste generation rates and composition may shift greatly in the future (in an unexpected fashion), limiting the accuracy of this estimate further into the future.
- 13.2.33 It is assumed that the broad composition of waste will not change and is well reflected by the 2024 data.
- 13.2.34 It is also assumed that treatment and landfilling options will not change over the period studied. The availability of recycling facilities and preferential treatment options is expected to increase, thus estimated recycling rates and landfill diversion rates represent a worst-case scenario.
- 13.2.35 Since the information regarding the recovery and diversion from landfill volumes or weights is unavailable, the impact assessment will be based on the likely composition of waste streams and reasonable assertions will be made about disposal. The lack of data on landfill void capacity and landfill diversion limits the assessment of environmental impacts for waste generation, based on landfill void capacity, thus this assessment is based on professional judgement and based on other projects of a similar size and nature.

### Mitigation

- 13.2.36 It is assumed that the Project will aim to minimise the generation of waste.
- 13.2.37 It is assumed that all topsoil will be suitable for reuse on site or on projects locally. Where this is not possible, it is assumed that all vegetation and made ground material will be sent to local waste infrastructure for treatment and reuse and thus will not be required to be landfilled.
- 13.2.38 It has been assumed that all remaining waste identified for disposal will be recycled where possible. The waste that cannot be recycled or treated will be sent to landfill.
- 13.2.39 It is assumed that waste will be appropriately managed during construction and operation, meeting any local legal and international requirements (i.e. embedded mitigation).

## 13.3 Baseline

### Current baseline

- 13.3.1 This section provides an overview of the existing waste management infrastructure and procedures at ALA as well as the expected construction and operational waste types resulting from the Project.
- 13.3.2 There are six municipal waste recycling enterprises in Almaty City (Government of the Republic of Kazakhstan, 2023). It is also reported that in Almaty City in 2019 the recycling rate was 10.95%. It is assumed that the remaining 89.05% was landfilled.
- 13.3.3 The exact location of facilities that are used by ALA are not listed here, as this information was not available at the time of preparing this ESIA. Instead, the companies responsible for managing or treating the waste are listed in Table 13.4 and Table 13.5.
- 13.3.4 Within ALA, oil sludge from the fuel farms (both aviation and gasoline) and waste from the maintenance area is collected on site and stored in an underground storage tank to the northern extent of the airport boundary. Hazardous waste is segregated and stored in a separate facility on site at the northern extent of the airport apron. These wastes are stored appropriately before removal from site via an authorised waste carrier to a municipal waste management facility (Appendix 13.A: Site photos).
- 13.3.5 Table 13.4 and Table 13.5 outline the types and volume of waste generated at ALA. In total 33,651.45 tonnes of non-hazardous waste was generated in 2024 (4,651.45 tonnes excluding construction waste), which serviced approximately 11.4 million passengers in 2024 (ALA, March 2025 Draft Master Plan). 75.10 tonnes of hazardous waste were generated. Based on this, the calculated waste generation rate (kg/passenger) for each waste stream is listed in Table 13.4 and Table 13.5. The individual or legal entity responsible for taking the waste is listed, however the final waste treatment facility used will be dependent on the appointed EPC Contractors and thus has not been provided.

**Table 13.4: Weight of non-hazardous waste reported in 2024 and treatment/disposal destination**

| Waste description                             | Waste code | Weight (tonnes) | Waste generation rate (kg/ passenger) | Individual or legal entity responsible for taking the waste*                                                                                                |
|-----------------------------------------------|------------|-----------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mixed construction and demolition wastes      | 17 09 04   | 29000.000       | 2.54386                               | ИП "КаРиДа"<br>IE "KaRiDa"                                                                                                                                  |
| Mixed Municipal waste                         | 20 03 01   | 4560.000        | 0.40000                               | ТОО "Эко Сервис Алматы"<br>Eco Service Almaty LLP                                                                                                           |
| Plastics                                      | 20 01 39   | 34.562          | 0.00303                               | ИП Рысбек Ж.Р., ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ"<br>Individual Entrepreneur Rysbek ZH.R., LIMITED LIABILITY PARTNERSHIP "VITA PROM" |
| Discarded electrical and electronic equipment | 20 01 36   | 2.387           | 0.00021                               | ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ"<br>LIMITED LIABILITY PARTNERSHIP "VITA PROM"                                                       |
| End-of-life tyres                             | 16 01 03   | 23.940          | 0.00210                               | ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ                                                                                                                                 |

| Waste description                                                | Waste code | Weight (tonnes)  | Waste generation rate (kg/ passenger) | Individual or legal entity responsible for taking the waste*                                                                                  |
|------------------------------------------------------------------|------------|------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                  |            |                  |                                       | ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ"<br>LIMITED LIABILITY PARTNERSHIP "VITA PROM"                                                                     |
| Ferrous metal                                                    | 16 01 17   | 24.576           | 0.00216                               | ТОО "АКАТ-21"<br>АКАТ-21 LLP                                                                                                                  |
| Other fractions not otherwise specified (non-hazardous)          | 20 01 99   | 0.850            | 0.00007                               | ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ"<br>LIMITED LIABILITY PARTNERSHIP "VITA PROM"                                         |
| Paper and cardboard                                              | 20 01 01   | 4.835            | 0.00042                               | ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ", ТОО "Карина Папер"<br>LIMITED LIABILITY PARTNERSHIP "VITA PROM", LLP "Karina Paper" |
| Sawdust, shavings, cuttings, wood, particle board and veneer     | 03 01 05   | 0.300            | 0.00003                               | (not provided)                                                                                                                                |
| <b>Total non-hazardous waste (including construction wastes)</b> | <b>N/A</b> | <b>33,651.45</b> | <b>2.95</b>                           | <b>N/A</b>                                                                                                                                    |
| <b>Total non-hazardous waste (excluding construction wastes)</b> | <b>N/A</b> | <b>4,651.45</b>  | <b>0.41</b>                           | <b>N/A</b>                                                                                                                                    |

Source: Mott MacDonald based on waste generation data from 2024 (R ALA, received June 2025 Annual waste inventurisation report for 2024 year) and passenger numbers reported in 2024 (ALA, March 2025 Draft Master Plan).

\*Annual waste inventurisation report for 2024 year (ALA, received June 2025).

**Table 13.5: Weight of hazardous waste reported in 2024 and treatment/disposal destination**

| Waste description                                    | Waste code | Weight (tonnes) | Waste generation rate (kg/ passenger) | Individual or legal entity responsible for taking the waste*                                          |
|------------------------------------------------------|------------|-----------------|---------------------------------------|-------------------------------------------------------------------------------------------------------|
| Infectious waste from humans                         | 18 01 03*  | 0.0123          | 0.000001                              | ТОО "Технопарк-2030"<br>Technopark-2030 LLP                                                           |
| Infectious waste from animals                        | 18 02 02*  | 0.095           | 0.000008                              | ТОО "Ветстанция"<br>Vetstantsiya LLP                                                                  |
| Fluorescent tubes and other mercury-containing waste | 20 01 21*  | 0.124           | 0.000011                              | ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ"<br>LIMITED LIABILITY PARTNERSHIP "VITA PROM" |
| Desalter sludges or emulsions                        | 13 01 08*  | 9.000           | 0.000789                              | ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ"<br>LIMITED LIABILITY PARTNERSHIP "VITA PROM" |



| Waste description                                                                                                                                     | Waste code | Weight (tonnes) | Waste generation rate (kg/passenger) | Individual or legal entity responsible for taking the waste*                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------|--------------------------------------|-------------------------------------------------------------------------------------------------------|
| Oil filters                                                                                                                                           | 16 01 07*  | 4.970           | 0.000436                             | ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ"<br>LIMITED LIABILITY PARTNERSHIP "VITA PROM" |
| Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by hazardous substances | 15 02 02*  | 0.325           | 0.000029                             | ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ"<br>LIMITED LIABILITY PARTNERSHIP "VITA PROM" |
| Wastes containing oil                                                                                                                                 | 16 07 08*  | 45.100          | 0.003956                             | ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ"<br>LIMITED LIABILITY PARTNERSHIP "VITA PROM" |
| Waste paint and varnish containing organic solvents or other hazardous substances                                                                     | 08 01 11*  | 0.300           | 0.000026                             | ТОВАРИЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ "ВИТА ПРОМ"<br>LIMITED LIABILITY PARTNERSHIP "VITA PROM" |
| Lead batteries                                                                                                                                        | 16 06 01*  | 15.178          | 0.001331                             | ТОО "АКАТ-21"<br>AKAT-21 LLP                                                                          |
| <b>Total hazardous waste</b>                                                                                                                          | <b>NA</b>  | <b>75.104</b>   | <b>0.0066</b>                        | <b>NA</b>                                                                                             |

Source: Mott MacDonald based on waste generation data from 2024 (ALA, received June 2025 Annual waste inventourisation report for 2024 year) and passenger numbers reported in 2024 (ALA, March 2025 Draft Master Plan)  
\*Annual waste inventourisation report for 2024 year (ALA, received June 2025).

## Future baseline

- 13.3.6 In order to better understand the impact on waste generation and thus the potential impact on receptors it is necessary to consider waste generation if the Project were to not go ahead.
- 13.3.7 If the Project were not to go forward no construction waste would be generated. It is not foreseen that operational waste generation will significantly increase.
- 13.3.8 Without the Project, passenger numbers are not expected to grow significantly, and operations are likely to remain consistent.

## 13.4 Potential impacts

- 13.4.1 The following potential impacts that may be caused by the (mis)handling of waste and resources in the construction and operational phase of the Project include:
- Mismanagement of materials or waste, resulting in the temporary or permanent degradation of the natural environment
  - Release of greenhouse gas emissions (e.g. through transportation and waste management)
  - Visual Impacts, noise, vibration, disruption to traffic and other potential causes of nuisance
  - Negative impacts on human health (health and safety hazards)

- Increased pressure on landfill void capacity
- Unsustainable use or loss of resources to landfill resulting in the temporary or permanent degradation of the natural environment
- Ecological impacts

## 13.5 Assessment of effects

### Construction phase effects

- 13.5.1 Quantitative information presented in this section is based on the elements for which EPC Contractors have been appointed and quantitative information made available. Construction waste is assessed qualitatively for all other elements.
- 13.5.2 A significant volume of construction waste is expected to be generated by the Project. This will include:
- Construction waste from excavation and demolition activities
  - Mishandling/ surplus of construction material
  - Packaging material
  - Municipal solid waste generated by construction workers
- 13.5.3 It is likely that a large proportion of this waste will be diverted from landfill.
- 13.5.4 The Project will generate waste through enabling works and the construction of these elements. The excavation and demolition waste arising and their reuse or disposal is stated in Table 13.6. Table 13.7 lists the potential waste types that may be generated. The likely waste composition, the treatment/ disposal options and location of waste treatment facilities are given in Table 13.8.

**Table 13.6: Excavation and demolition waste reuse/ disposal from the Project**

| Material/waste                                     | Quantity (m³)    | Weight (Tonnes)  |
|----------------------------------------------------|------------------|------------------|
| Demolition of structures/pavement                  | 65,453           | 163,633          |
| Asphalt pavement                                   | 50,276           | 125,690          |
| Concrete pavement                                  | 150              | 360              |
| Excavated materials (soils/organics)               | 1,907,859        | 3,052,575        |
| <b>Total waste generated</b>                       | <b>2,023,738</b> | <b>3,342,258</b> |
| Reuse of excavated material without any process    | 1,056,627        | 1,690,603        |
| Reuse of excavated material after chemical process | 12,000           | 19,200           |
| <b>Total excavated material reused on site</b>     | <b>1,068,627</b> | <b>1,709,803</b> |
| <b>Total waste removed from the Project site</b>   | <b>955,112</b>   | <b>1,632,455</b> |

Source: YDA SMS, received June 2025 Waste Volumes and Landfill

**Table 13.7: Waste type and potential treatment**

| Location          | Waste description           | Potential treatment  |
|-------------------|-----------------------------|----------------------|
| Fuel Farm         | Excavated soil and rocks    | Inert (landfilled)   |
|                   | Steel rebar scraps          | Recyclable           |
|                   | HDPE membrane cuttings      | Recyclable           |
|                   | Pipe off-cuts               | Recyclable           |
|                   | Empty cable reels           | Recyclable           |
| Catering Facility | Concrete and mortar residue | Inert (landfilled)   |
|                   | Plastic packaging waste     | Recyclable (Plastic) |

| Location         | Waste description                 | Potential treatment |
|------------------|-----------------------------------|---------------------|
| Airport Pavement | HVAC duct cut-offs                | Recyclable (Metal)  |
|                  | Wire and conduit waste            | Recyclable          |
|                  | Existing unsuitable soil to spoil | Recyclable          |
|                  | Pavement core cuttings            | Inert (landfilled)  |
|                  | Asphalt milling waste             | Recyclable          |
|                  | Old concrete slabs                | Recyclable          |
|                  | Old concrete pavement dowel bars  | Recyclable          |

Source: ALA, Received June 2025 Material Plan

**Table 13.8: The treatment/disposal method and facility location where applicable for construction waste streams**

| Waste Type           | Composition | Treatment / Disposal Method                                                 | Facility Location                                        |
|----------------------|-------------|-----------------------------------------------------------------------------|----------------------------------------------------------|
| Concrete and asphalt | 4.3%        | Crushing and reuse as aggregate or base layer                               | On-site mobile crusher or crushing plant                 |
| Steel                | 2.1%        | Collected and sent for recycling                                            | Local scrap metal dealers                                |
| Timber               | 0.8%        | Reuse where possible, else landfill                                         | Local municipal landfill or wood recycling               |
| Plastic/packaging    | 0.4%        | Recyclable plastics to recycling centres, others to landfill                | City recycling centres                                   |
| Hazardous waste      | 0.9%        | Specialized hazardous waste disposal contractor                             | Licensed hazardous waste facility (near industrial zone) |
| Excavated soil       | 85.7%       | Reuse on-site for backfilling, or disposal in licensed inert waste landfill | Landfill                                                 |

Source: YDS SMS, received July 2025 Construction Waste Streams and Waste Treatment

13.5.5 Material brought to the site for construction has the potential to become waste (e.g. through mishandling, damage or contamination). It is estimated that 10% of material brought to the site for construction will become waste (RICS, 2023<sup>13</sup>).

13.5.6 Table 13.9 lists the material that is expected to be brought to the site for construction, the expected quantity of that material and likely waste arisings.

**Table 13.9: Material used in the construction phase that has the potential to become waste**

| Description                      | Unit           | Quantity  | Potential waste (10% of material) (RICS, 2023) |
|----------------------------------|----------------|-----------|------------------------------------------------|
| Pavements                        |                |           |                                                |
| Fly ash                          | m <sup>3</sup> | 900       | 90                                             |
| Cement                           | Tonnes         | 128,221   | 12,822                                         |
| Chemical Admixtures for Concrete | Tonnes         | 1,180     | 118                                            |
| Capping Layer (PGS)              | m <sup>3</sup> | 1,127,166 | 112,717                                        |

<sup>13</sup> RICS (2023) Whole life carbon assessment for the built environment, 2nd edition

| Description                              | Unit           | Quantity  | Potential waste (10% of material) (RICS, 2023) |
|------------------------------------------|----------------|-----------|------------------------------------------------|
| Geotextiles                              | m <sup>2</sup> | 2,003,400 | 200,340                                        |
| Bitumen Emulsion                         | Tonnes         | 664       | 66                                             |
| Bitumen                                  | Tonnes         | 7,137     | 714                                            |
| Polymer Modified Bitumen                 | Tonnes         | 6,290     | 629                                            |
| Crushed Aggregate                        | Tonnes         | 539,860   | 53,986                                         |
| Aggregate                                | m <sup>3</sup> | 405,875   | 40,588                                         |
| Sealing cord made of foamed polyethylene | m <sup>3</sup> | 204,955   | 20,496                                         |
| Bituminous mastic                        | l              | 81,982    | 8,198                                          |
| Dowel Bar                                | Tonnes         | 8,842     | 884                                            |
| <b>Stormwater Drainage</b>               |                |           |                                                |
| Reinforced concrete pipe Ø500-1500mm     | m              | 19,077    | 1,908                                          |
| PVC Ø300mm pipe                          | m              | 2,871     | 287                                            |
| Line gutters                             | m              | 5,952     | 595                                            |
| Drainage Manholes                        | Unit           | 334       | 33                                             |
| Corrugated drainage pipe                 | m              | 28,603    | 2,860                                          |
| Oil-water separator                      | l              | 1         | 0                                              |
| De-icing fluid collection system         | Unit*          | 1         | 0                                              |
| <b>Marking</b>                           |                |           |                                                |
| Reflective paint for marking             | l              | 14,992    | 1,499                                          |
| <b>Airfield Ground Lighting (AGL)</b>    |                |           |                                                |
| Electrical Ducts                         | l              | 259,385   | 25,939                                         |
| Airfield Manholes                        | Unit*          | 666       | 67                                             |
| Bare Coppers for Earthing                | Unit*          | 40,110    | 4,011                                          |
| Copper Clads for Earthing                | Unit*          | 660       | 66                                             |
| Cables                                   | Unit*          | 635,835   | 63,584                                         |
| Connector kits                           | Unit*          | 6,866     | 687                                            |
| Approach Lights                          | Unit*          | 445       | 45                                             |
| Runway Lights                            | Unit*          | 682       | 68                                             |
| Runway PAPI                              | Unit*          | 8         | 1                                              |
| Taxiway Lights                           | Unit*          | 1,969     | 197                                            |
| Illuminated Airfield Signs               | Unit*          | 105       | 11                                             |
| Floodlighting                            | Unit*          | 127       | 13                                             |
| <b>Fence</b>                             |                |           |                                                |
| Fence                                    | m              | 2,000     | 200                                            |

\*Unit refers to single unit of the construction material

Source: YDA SMS, received July 2025 Materials

### 13.5.7

During peak construction period, (October 2025-November 2027) there will be approximately 426 workers on site (YDA SMS, received June 2025 Detailed Manpower Schedule and Histograms). In addition to construction waste, municipal solid waste will be generated by these construction workers. It is estimated that approximately 0.41 tonnes of additional non-hazardous solid waste will be generated from July 2025 to December 2027 in the construction phase.

- 13.5.8 The mismanagement of materials and solid waste may lead to significant effects particularly on health and safety as well as through contamination of the environment. For the construction phase, the sensitivity of effect from the mismanagement of materials and waste is likely to be **medium** (Table 4.2), the magnitude will be **major adverse** (Table 4.3), and effects are likely to be **major adverse (significant)** (Table 4.4).
- 13.5.9 IEMA (2020) guidance for environmental impact assessment for the disposal of waste, require information on available landfill void capacities within the region. In the absence of information for available regional landfill void capacities and the quantities of waste arisings, it is anticipated that the majority of the waste (considering that 1,632,455 tonnes is estimated only for the project components where quantitative information has been provided) is likely to be sent to a treatment facility and not disposed to regional landfill sites. Therefore, based on IEMA (2020) guidance for environmental impact assessment for the disposal of waste criteria, for the construction phase, the sensitivity of effect from disposal of construction waste is likely to be **medium** (Table 13.1), the magnitude will be **minor** (Table 13.2), effects are likely to be **minor adverse (not significant)** (Table 13.3).
- 13.5.10 The potential effects of unmitigated mismanagement of waste and resources on the environment and human receptors as well as on landfill void capacity in the construction phase are summarised in Table 13.10.

**Table 13.10: Summary of significance assessment of potential unmitigated impacts that may occur in the construction phase**

| Activity                                  | Potential Impact                                                                                                                                                                           | Magnitude of impact             | Receptor Sensitivity | Impact Evaluation | Significance of Effect |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------------------|-------------------|------------------------|
| Mismanagement of material and solid waste | Contamination of environments (specifically surface watercourse, groundwater and the ground) due to leakage and spillage of wastes associated with poor handling and storage arrangements. | Adverse, permanent and moderate | Medium               | Moderate adverse  | Significant            |
|                                           | Fugitive emissions, such as dust, associated with the handling and storage of some waste streams.                                                                                          | Adverse, temporary and minor    | Low                  | Negligible        | Not significant        |
|                                           | Visual amenity impacts associated with poor storage of waste at the construction site                                                                                                      | Adverse, temporary and minor    | Low                  | Negligible        | Not significant        |
|                                           | Health and safety hazards due to inappropriate handling and storage of waste particularly hazardous waste.                                                                                 | Adverse, permanent and major    | Medium               | Major adverse     | Significant            |
| Landfill void capacity*                   | Pressure on existing landfill capacities.                                                                                                                                                  | Adverse, temporary and minor    | Medium               | Minor adverse     | Not significant        |
|                                           | Increased travelling from transporting waste from the Project site.                                                                                                                        | Adverse, temporary and minor    | Low                  | Negligible        | Not significant        |

\* Based on professional judgement

## Operational phase effects

- 13.5.11 In the operational phase, it is likely that waste generated will be increased when compared to a future baseline (should the Project not go ahead). As part of the Project, additional capacity for passengers and cargo will be created. As such, the volume of waste from the catering and hospitality of workers and passengers, packaging waste, and waste generated from maintenance and cleaning will be increased. However, the composition of the waste is unlikely to change significantly.

- 13.5.12 If the Project were to go forward, there would be more passengers transiting ALA compared to a future baseline (if the Project were not to go ahead). More waste would therefore be generated. If recycling/treatment rates remain the same, in the period 2030-2050, more waste would also be landfilled. **Expected passengers, waste generated, and landfill diversion rates** in 2030, 2040, 2050 summarises the expected passengers, waste generated and landfill diversion rates through the operational phase.

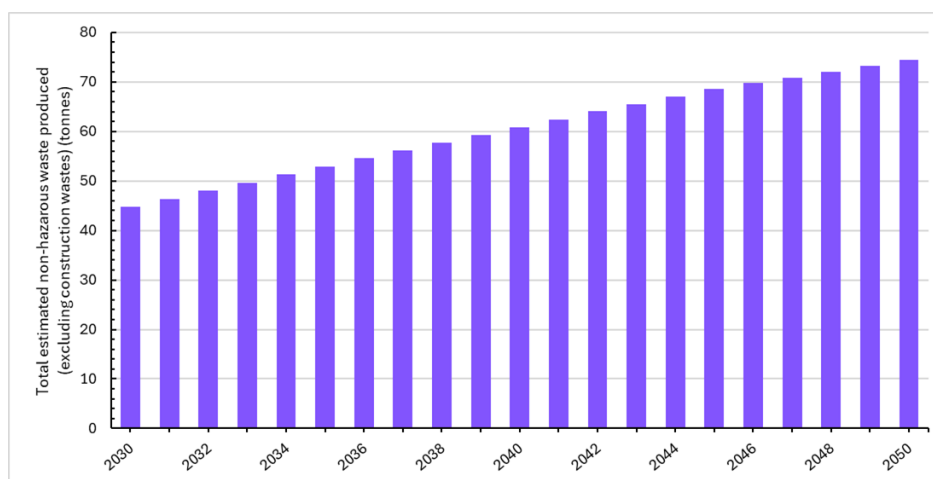
**Table 13.11: Expected passengers, waste generated, and landfill diversion rates through the operational phase**

| Expected passengers, waste generated, and landfill diversion rates in 2030, 2040, 2050 | Unit                    | Operational phase |
|----------------------------------------------------------------------------------------|-------------------------|-------------------|
| <b>Passengers served 2030</b>                                                          | <b>Passenger number</b> | <b>109,710</b>    |
| Total non-hazardous waste generated in 2030 (excluding construction waste)             | Tonnes                  | 44.76             |
| Diverted from landfill in 2030, based on 10.95%                                        | Tonnes                  | 4.90              |
| Landfilled in 2030, based on 89.05%                                                    | Tonnes                  | 40                |
| <b>Passengers served 2040</b>                                                          | <b>Passenger number</b> | <b>149,023</b>    |
| Total non-hazardous waste generated in 2040 (excluding construction waste)             | Tonnes                  | 60.80             |
| Diverted from landfill in 2040, based on 10.95%                                        | Tonnes                  | 6.66              |
| Landfilled in 2040, based on 89.05%                                                    | Tonnes                  | 54                |
| <b>Passengers served 2050</b>                                                          | <b>Passenger number</b> | <b>182,330</b>    |
| Total non-hazardous waste generated in 2050 (excluding construction waste)             | Tonnes                  | 74.39             |
| Diverted from landfill in 2050, based on 10.95% (Tonnes)                               | Tonnes                  | 8.15              |
| Landfilled in 2050, based on 89.05% (Tonnes)                                           | Tonnes                  | 66.25             |

Source: Mott MacDonald based on waste generation data from 2024 (ALA, received June 2025 Annual waste inventories report for year 2024) and passenger numbers reported in 2024 (ALA, March 2025 Draft Master Plan).

Estimation of waste generation in the operational phase of the Project uses projected passenger numbers from air traffic modelling (Mott MacDonald, August 2025 Project Horizon Traffic Forecasts Outputs (DRAFT V6.0)).

**Figure 13.1: Calculated total non-hazardous waste generated (excluding construction wastes) per year from 2030 to 2050 after completion of the Project**



Source: Mott MacDonald based on waste generation data from 2024 (ALA, received June 2025 Annual waste inventorisation report for year 2024) and passenger numbers reported in 2024 (ALA, March 2025 Draft Master Plan).

Estimation of waste generation in the operational phase of the Project uses projected passenger numbers from air traffic modelling (Mott MacDonald, August 2025 Project Horizon Traffic Forecasts Outputs (DRAFT V6.0)).

- 13.5.13 The mismanagement of materials and waste may lead to significant effects particularly on health and safety as well as through contamination of the environment. The sensitivity of effect from the mismanagement of materials and waste is likely to be **medium**, the magnitude will be **major adverse**, and effects are likely to be **major adverse (significant)**.
- 13.5.14 IEMA (2020) guidance for environmental impact assessment for the disposal of waste, requires information on available landfill void capacities within the region. In the absence of information for available regional landfill void capacities and the quantities of waste arisings, it is assumed that as much of the operational waste generated will be recycled/treated where feasible and not disposed to regional landfill sites. This projected waste is likely to be generated over a 25-year period. Therefore, based on IEMA guidance the environmental impact assessment on landfill void capacity, for the operational phase, the sensitivity of effect from disposal of operational waste is likely to be **low**, the magnitude will be **minor**, effects are likely to be **negligible (not significant)**
- 13.5.15 The potential effects of unmitigated mismanagement of waste and resources on the environment and human receptors as well as on landfill void capacity in the operational phase are summarised in Table 13.12.

**Table 13.12: Summary of significance assessment of potential unmitigated impacts that may occur in the operational phase**

| Activity                            | Potential Impact                                                                                                                                                                          | Magnitude of impact             | Receptor Sensitivity | Impact Evaluation | Significance of Effect |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------------------|-------------------|------------------------|
| Mismanagement of material and waste | Contamination of environments (specifically surface watercourse, groundwater and the ground) due to leakage and spillage of wastes associated with poor handling and storage arrangements | Adverse, permanent and moderate | Medium               | Moderate adverse  | Significant            |
|                                     | Fugitive emissions, such as dust, associated with the handling and storage of some waste streams                                                                                          | Adverse, temporary and minor    | Low                  | Negligible        | Not significant        |
|                                     | Visual amenity impacts associated with poor storage of waste                                                                                                                              | Adverse, temporary and minor    | Low                  | Negligible        | Not significant        |
|                                     | Health and safety hazards due to inappropriate handling and storage of waste particularly hazardous waste                                                                                 | Adverse, permanent and major    | Medium               | Major adverse     | Significant            |
| Landfill void capacity*             | Pressure on existing landfill capacities                                                                                                                                                  | Adverse permanent and minor     | Low                  | Negligible        | Not significant        |
|                                     | Increased travelling from transporting waste from the Project site                                                                                                                        | Adverse, temporary and minor    | Low                  | Negligible        | Not significant        |

\* Based on professional judgement

## 13.6 Mitigation

13.6.1 The following embedded mitigations are already in place at ALA:

- Working with licensed third party waste companies

- Annual waste inventories report prepared
- Certain waste types are reused and recycled
- Segregation of hazardous waste
- Operational WMP (ALA, 2023 ALA Waste management program 2023-2032 years)

13.6.2 The following embedded mitigations are planned at ALA:

- Hazardous waste storage locations assessment for international good practice
- In maintenance and repair zone will be new construction, including oil discharge point

13.6.3 This section takes into account the previous Environmental and Social Management Plan (ESMP) (August 2021), the existing WMP and the Consolidated Compliance Summary Report (June 2025).

13.6.4 It is recommended that the mitigation stated here are incorporated into the framework ESMP, where practicable.

### Construction phase mitigation

13.6.5 WMPs specific to the construction phase will be created by the EPC Contractors and form a part of their individual Construction Environmental and Social Management Plans (C-ESMPs) based on guidance from IFC Performance Standard 3 (2012) and followed throughout the construction phase. The construction WMP will detail the site procedures to manage construction waste, including hazardous waste. It will identify the quantities and categories of waste for processing, confirm the capacity of the local landfills, and establish a processing plan for the hazardous waste. This will be a live document and additions/updates to this will be made as appropriate. All EPC Contractors and workers on site will be expected to comply with the WMP.

13.6.6 It is recommended that the international guidance listed in Section 13.2 is to be followed throughout, where practicable.

13.6.7 Where practicable, it is recommended that:

- Orientation/induction training is provided to workers regarding proper waste segregation, correct handling and storage of hazardous materials, disposal and emergency procedures.
- Personal protective equipment (PPE) is provided where appropriate.

13.6.8 Mitigation measures will be implemented on all aspects of the Project to reduce the effects of waste generation by the Project during the construction phase. Likely impacts are not expected to be significant provided GIIP for waste management and disposal is adhered to throughout the construction phase of the Project, where practicable. It is recommended that, where practicable, the waste hierarchy is followed, which prioritises the management of waste in the following order:

- The generation of construction waste will be avoided, where possible. Suitable planning and mitigation measures will allow this to be minimised.
- The reuse of materials will be explored, based on the facilities available in the area and applicable waste legislation. A preferred option is to reuse excavated materials in situ, which would significantly reduce the volume of unused materials requiring disposal.
- Additionally, opportunities for recycling metal, timber and clean construction rubble will be considered. Construction waste will be recycled, where possible.
- Construction waste will be disposed of in landfill as a last resort.

13.6.9 Where possible, suppliers that use returnable, reusable, or practicably recyclable packaging are prioritised in the planning stage of construction. It is recommended that unused material is returned and packaging recycled, where possible.



- 13.6.10 Segregated point of waste generation bins for municipal solid waste are provided throughout the ALA, construction site and any facilities for construction workers.
- 13.6.11 The appropriate management and storage of materials during the construction phase of the Project is essential to mitigate the effects on the environment. Where practicable, recommendations to be implemented according to GIIP include the following measures:
- Waste is segregated by classification. This will maximise opportunities for materials and waste to be reused, recycled, treated and diverted from landfill.
  - Sufficient number of skips or other adequate containers are provided for the collection of the different types of wastes.
  - Colour-coded bins and labelled skips are provided according to waste classification.
  - Materials are stored in sealed containers at designated areas with clear and precise labelling.
  - All recycling containers are clearly labelled. Containers are located in close proximity to the site under construction in which recyclables/salvageable materials will be placed.
- 13.6.12 Hazardous materials such as paints, solvents and lubricants will be managed and stored appropriately in the existing dedicated area. ALA has provided photographic evidence of the current practices in place to allow storage and management of hazardous material (Appendix 13.A: Site photos). Hazardous materials are stored indoors on a hard surface to allow for collection of accidental spills, which reduces the risk of environmental pollution during both normal operations and emergencies. Storage locations are to be assessed against environmental safety good practice, and corrective actions developed and implemented. The following measures are required based on GIIP, where practicable:
- Access to the hazardous waste storage area is limited to authorised and trained personnel.
  - Waste is segregated such that hazardous materials do not mix with incompatible hazardous material or non-hazardous material.
  - Waste storage is located away from sensitive receptors (e.g. passengers, housing, natural drainage and water bodies).
  - Hazardous waste/material is stored in appropriate enclosed containers, away from direct sunlight wind and rain.
  - Where volatile wastes are stored, adequate ventilation is provided.
  - An impermeable dike (bund) with a volume of at least 110% of the largest tank or container will be used for storage, or 25% of the total vessel volume to be stored in the bund, whichever volume is greater. This bund will be constructed around the waste oil and chemical storage area to contain leaks and spills arising from the materials stored.
  - Hazardous waste storage areas have spill containment systems and be protected to avoid run-off to and from the storage area.
  - Perimeter cut off drainage is constructed to contain leaks, spills, and run off.
  - Firefighting equipment is provided in close proximity to the storage and collection centres.
  - Chemical and hydrocarbon absorbent materials is provided to clean up spills and leaks.
  - Hazardous waste containers for storage and transport is appropriately marked and labelled.
- 13.6.13 To prevent nuisances (e.g. noise, litter, dust and odours) the following measures are recommended, where practicable:
- Good housekeeping and cleaning is maintained throughout storage areas and the ALA site.
  - Appropriate pest control measures are implemented.
  - Skips are covered where appropriate (e.g. where dusty, odorous wastes are stored).

- Dusty wastes are watered down as required (e.g. during strong windy periods).
  - Project-related waste is placed in dedicated areas inside the Project boundary.
  - Training is provided on the importance of cleanliness and not dumping waste outside the Project boundary.
- 13.6.14 Each type of waste or recyclable material will be handled by separate facilities accordingly.
- 13.6.15 All wastes will be transported offsite by vehicles with the appropriate capacity to safely transport the waste material. EPC Contractors employed are licenced by the relevant regulatory agencies. These vehicles are accompanied by:
- A chain-of-custody documentation to the final destination.
  - An up-to-date authorised hazardous waste passport for hazardous waste.
- 13.6.16 Final waste disposal facilities are:
- Located as close to ALA as possible to minimise the impacts of transportation (e.g. the release of carbon emissions). The appointed EPC Contractors will identify the closest and relevant treatment and disposal sites.
  - In close proximity to the Project so that long-haul transportation to separate facilities is minimised when separate treatment or disposal facilities are required.
  - Issued with the appropriate permits.
- 13.6.17 Mitigation measures that are required on site to encourage efficient handling and storage of material and reduction of waste arisings, and to reduce the potential impacts identified are as follows:
- Materials are delivered, as required and where practicable, to avoid damage or contamination.
  - Where site-won material is not available or suitable for reuse, secondary or recycled materials are procured, where available and practicable.
  - All suitable excavated material is reused in the construction of the Project and in landscaping features to reduce the requirement to import materials for construction and to reduce the need to remove surplus materials from site, where practicable.
  - Temporary stockpiling of fill materials prior to incorporation into the Project are avoided where possible, to minimise double handling and damage. However, where required, materials are be stockpiled in accordance with best practice and managed appropriately.
  - Locally sourced materials and suppliers will be identified and used, where practicable.
  - Pre-cast elements are used where practicable to encourage efficient use of materials and avoid the generation of waste arisings from off-cuts.
  - Materials are substituted with less hazardous or toxic materials, wherever technically appropriate and economically feasible to minimise hazardous contamination of the environment.
  - There are procedures and training for correct handling and storage of hazardous materials.
  - There are procedures and training for spillage reporting and response.
  - A Spill Prevention Plan and Emergency Preparedness and Response Plan (EPRP) for hazardous material management, is developed by the ALA or by the contractor, and maintained throughout construction. Where practicable, it is recommended that this document include:
    - Environmental impacts, mitigation, and monitoring as part of contractual arrangements with third parties such as fuel handlers and ground service companies.

- Fire training on impermeable surfaces surrounded by a retaining dyke to prevent foam and powder or other environmentally hazardous fire extinguishing agents or polluted fire water from entering the stormwater system.
- Treatment of water containing fire extinguishing agents and non-combusted flammable materials prior to discharge to surface water.
- Identification of the necessary bunding and spill kit requirements (and reference to the spill prevention and response plan).
- Details of the correct procedure for handling and storage of any hazardous materials.
- A map showing the material storage locations.
- Vehicle and equipment fuelling to be undertaken in designated areas on impermeable surfaces with adequate spill protection in place.
- Training requirements (as necessary) with respect to materials handling procedures, use of PPE, spill procedures and emergency preparedness and response procedures.
- The correct procedure for reporting any environmental incidents related to spills/leakages.

13.6.18 The following monitoring is recommended according to GIIP, where practicable. This includes:

- Local groundwater quality is monitored regularly (see **ESIA Chapter 9: Geology and soils**).
- Periodic inspections of waste storage areas are conducted and findings documented.
- Any spillages or leaks of hazardous materials/waste are recorded and investigated.
- Regular audits of waste segregation and collection practices.
- The types and quantities of waste generated during operations are regularly monitored.
- Investigation of complaints appropriate actions are taken and noted in the grievance log (refer to Stakeholder Engagement Plan for grievance mechanism).
- Relevant documentation for waste carriers and the permits of final waste disposal facilities are regularly checked to make sure these are in date and appropriate.

## Operational phase mitigation

13.6.19 Where practicable, it is required that mitigation measures for the operational phase include the following:

- Operational solid waste management will follow existing protocols for the current terminal. The current WMP is followed. This will be a live document and additions/updates to this will be made as appropriate. It is recommended that all contractors and workers on site comply with the WMP.
- The international guidance listed in section 13.2 is followed throughout.
- The BPEO for the waste within the context of the waste hierarchy is implemented.
- The mitigations that are implemented in the construction phase, listed in section 13.6, are largely applicable for the operational phase and implemented. This includes mitigations for segregation, storage, waste transport requirements and material/waste handling measures.
- Training applicable for management of non-hazardous and hazardous waste during the construction phase is also applicable for the operational phase of ALA.
- Segregated point of waste generation bins for municipal solid waste are also provided throughout the airport.
- Food establishments also segregate compostable and other food waste for recycling.
- Monitoring listed for the construction phase in section 13.6 is applicable for the operational phase and is implemented.

## 13.7 Summary of residual effects

13.7.1 Residual effects after the application of mitigation are presented in Table 13.13.

**Table 13.13: Summary of residual effects for waste and resources**

| Description of effect                                                                                                                                                                                                                     | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Residual effect | Proposed monitoring                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction phase</b>                                                                                                                                                                                                                 |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |                                                                                                                                                                                                                                                                                                                                                                                                              |
| Mismanagement of material and waste leading to contamination of environment (specifically surface watercourse, groundwater, and the ground) due to leakage and spillage of wastes associated with poor handling and storage arrangements. | Permanent              | Medium                  | Moderate            | Moderate adverse                                    | Where practicable, it is required that: <ul style="list-style-type: none"> <li>Construction WMPs are created and followed.</li> <li>Material management and storage areas are specially designed with considerations detailed in section 13.6.</li> <li>Waste storage areas are located away from sensitive receptors.</li> <li>There are procedures and training for correct handling and storage of hazardous materials.</li> <li>Materials are substituted with less hazardous or toxic materials, wherever possible.</li> <li>Transport of such materials are handled by appropriate and correctly authorised vehicles.</li> <li>Final disposal, where necessary, occurs at facilities that are correctly authorised.</li> </ul> | Minor adverse   | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Local groundwater quality is monitored.</li> <li>Periodic inspections of waste storage areas are conducted and findings documented.</li> <li>There is regular audits of waste segregation and collection practices.</li> <li>Any spillages or leaks of hazardous materials/waste are recorded and investigated.</li> </ul> |
| Fugitive emissions, such as dust, associated with the handling and storage of some waste streams.                                                                                                                                         | Temporary              | Low                     | Minor               | Negligible                                          | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Construction WMPs are created and followed.</li> <li>Waste storage areas are located away from sensitive receptors.</li> <li>PPE is provided to personnel where appropriate.</li> <li>Good housekeeping and cleaning practices are followed</li> <li>Dusty wastes are watered down as required.</li> <li>Training is provided on the importance of cleanliness</li> <li>Skips are covered where appropriate (e.g. where dusty or odorous wastes are stored).</li> </ul>                                                                                                                                                                            | Negligible      | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Periodic inspections of waste storage areas are conducted and findings documented.</li> <li>There are regular audits of waste segregation and collection practices.</li> <li>Any complaints are investigated, appropriate actions taken and noted in the grievance log.</li> </ul>                                         |

| Description of effect                                                                                     | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Residual effect | Proposed monitoring                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Visual amenity impacts associated with poor storage of waste                                              | Temporary              | Low                     | Minor               | Negligible                                          | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Construction WMPs are created and followed.</li> <li>Good housekeeping and cleaning practices are followed</li> <li>Segregated point of generation bins are provided.</li> <li>Skips are covered where appropriate.</li> <li>Waste are segregated by classification.</li> <li>Waste storage areas are located away from sensitive receptors.</li> <li>Waste is placed in dedicated areas inside the Project boundary.</li> <li>Training is provided on the importance of cleanliness and not dumping waste outside the Project boundary.</li> </ul>                                                                                                                                                                                        | Negligible      | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Periodic inspections of waste storage areas are conducted and findings documented.</li> <li>There are regular audits of waste segregation and collection practices.</li> <li>Any complaints are investigated, appropriate actions taken and noted in the grievance log.</li> </ul>                            |
| Health and safety hazards due to inappropriate handling and storage of waste particularly hazardous waste | Permanent              | Medium                  | Major               | Major adverse                                       | Where practicable, it is required that: <ul style="list-style-type: none"> <li>Construction WMPs are created and followed.</li> <li>Material management and storage areas are specially designed with the considerations detailed in section 13.6.</li> <li>PPE is provided to personnel where appropriate.</li> <li>There are procedures and training for correct handling and storage of hazardous materials.</li> <li>Materials are substituted with less hazardous or toxic materials, wherever possible.</li> <li>Transport of such materials are handled by appropriate and correctly authorised vehicles.</li> <li>Final disposal, where necessary, occurs at facilities that are correctly authorised.</li> <li>Spill Prevention Plan and EPRP for hazardous material management is created and followed.</li> </ul> | Negligible      | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Periodic inspections of waste storage areas are conducted and findings documented.</li> <li>There are regular audits of waste segregation and collection practices.</li> <li>Any spillages/ leaks of hazardous materials/waste or other health and safety incidents are recorded and investigated.</li> </ul> |

| Description of effect                                                                                                                                                                                            | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                   | Residual effect | Proposed monitoring                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pressure on existing landfill capacities                                                                                                                                                                         | Permanent              | Medium                  | Minor               | Minor adverse                                       | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Waste is appropriately segregated.</li> <li>Segregated point of generation bins are provided.</li> <li>The BPEO for the waste within the context of the waste hierarchy is implemented.</li> <li>Final disposal, where necessary, occurs at facilities that are correctly authorised.</li> </ul>                                                      | Negligible      | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Periodic inspections of waste storage areas are conducted and findings documented.</li> <li>There are regular audits of waste segregation and collection practices.</li> <li>The types and quantities of waste generated during operations are regularly monitored.</li> </ul> |
| Increased travelling from transporting waste from the Project site                                                                                                                                               | Temporary              | Low                     | Minor               | Negligible                                          | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Transport of such materials are handled by appropriate and correctly authorised vehicles.</li> <li>Chosen recycling or disposal facilities are located as close to ALA as possible.</li> <li>When separate treatment or disposal facilities are required, these are in close proximity to each other.</li> </ul>                                      | Negligible      | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Relevant documentation is kept up to date and regularly checked.</li> </ul>                                                                                                                                                                                                    |
| <b>Operational phase</b>                                                                                                                                                                                         |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                                                                                                                                                                                                                                                                                                                                                                  |
| Mismanagement of material and waste leading to contamination of environments (specifically surface watercourse, groundwater, and the ground) due to leakage and spillage of wastes associated with poor handling | Permanent              | Medium                  | Moderate            | Moderate adverse                                    | Where practicable, it is required that: <ul style="list-style-type: none"> <li>The existing operational WMP is followed.</li> <li>Material management and storage areas are specially designed with the considerations detailed in section 13.6.</li> <li>Waste storage areas are located away from sensitive receptors.</li> <li>There are procedures and training for correct handling and storage of hazardous materials.</li> </ul> | Minor adverse   | Where practicable, it is recommended that: <ul style="list-style-type: none"> <li>Local groundwater quality is monitored.</li> <li>Periodic inspections of waste storage areas are conducted and findings documented.</li> <li>There are regular audits of waste segregation and collection practices.</li> </ul>                                                |

| Description of effect                                                                            | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Residual effect | Proposed monitoring                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| and storage arrangements                                                                         |                        |                         |                     |                                                     | <ul style="list-style-type: none"> <li>Materials are substituted with less hazardous or toxic materials, wherever possible.</li> <li>Transport of such materials are handled by appropriate and correctly authorised vehicles.</li> <li>Final disposal, where necessary, occurs at facilities that are correctly authorised.</li> </ul>                                                                                                                                                                                                                                                     |                 | <ul style="list-style-type: none"> <li>Any spillages or leaks of hazardous materials/waste are recorded and investigated.</li> </ul>                                                                                                                                                                                                                                        |
| Fugitive emissions, such as dust, associated with the handling and storage of some waste streams | Temporary              | Low                     | Minor               | Negligible                                          | <p>Where practicable, it is recommended that:</p> <ul style="list-style-type: none"> <li>The existing operational WMP is followed.</li> <li>Waste storage is located away from sensitive receptors.</li> <li>PPE is provided to personnel where appropriate.</li> <li>Good housekeeping and cleaning practices are followed.</li> <li>Dusty wastes are watered down as required.</li> <li>Training is provided on the importance of cleanliness</li> <li>Skips are covered where appropriate.</li> </ul>                                                                                    | Negligible      | <p>Where practicable, it is recommended that:</p> <ul style="list-style-type: none"> <li>Periodic inspections of waste storage areas are conducted and findings documented.</li> <li>There are regular audits of waste segregation and collection practices.</li> <li>Any complaints are investigated, appropriate actions taken and noted in the grievance log.</li> </ul> |
| Visual amenity impacts associated with poor storage of waste                                     | Temporary              | Low                     | Minor               | Negligible                                          | <p>Where practicable, it is recommended that:</p> <ul style="list-style-type: none"> <li>The existing operational WMP is followed.</li> <li>Good housekeeping and cleaning practices are followed.</li> <li>Segregated point of generation bins are provided.</li> <li>Waste segregated is by classification.</li> <li>Waste storage areas are located away from sensitive receptors.</li> <li>Waste is placed in dedicated areas inside the Project boundary.</li> <li>Training is provided on the importance of cleanliness and not dumping waste outside the Project boundary</li> </ul> | Negligible      | <p>Where practicable, it is recommended that:</p> <ul style="list-style-type: none"> <li>Periodic inspections of waste storage areas are conducted and findings documented.</li> <li>There are regular audits of waste segregation and collection practices.</li> <li>Any complaints are investigated, appropriate actions taken and noted in the grievance log.</li> </ul> |



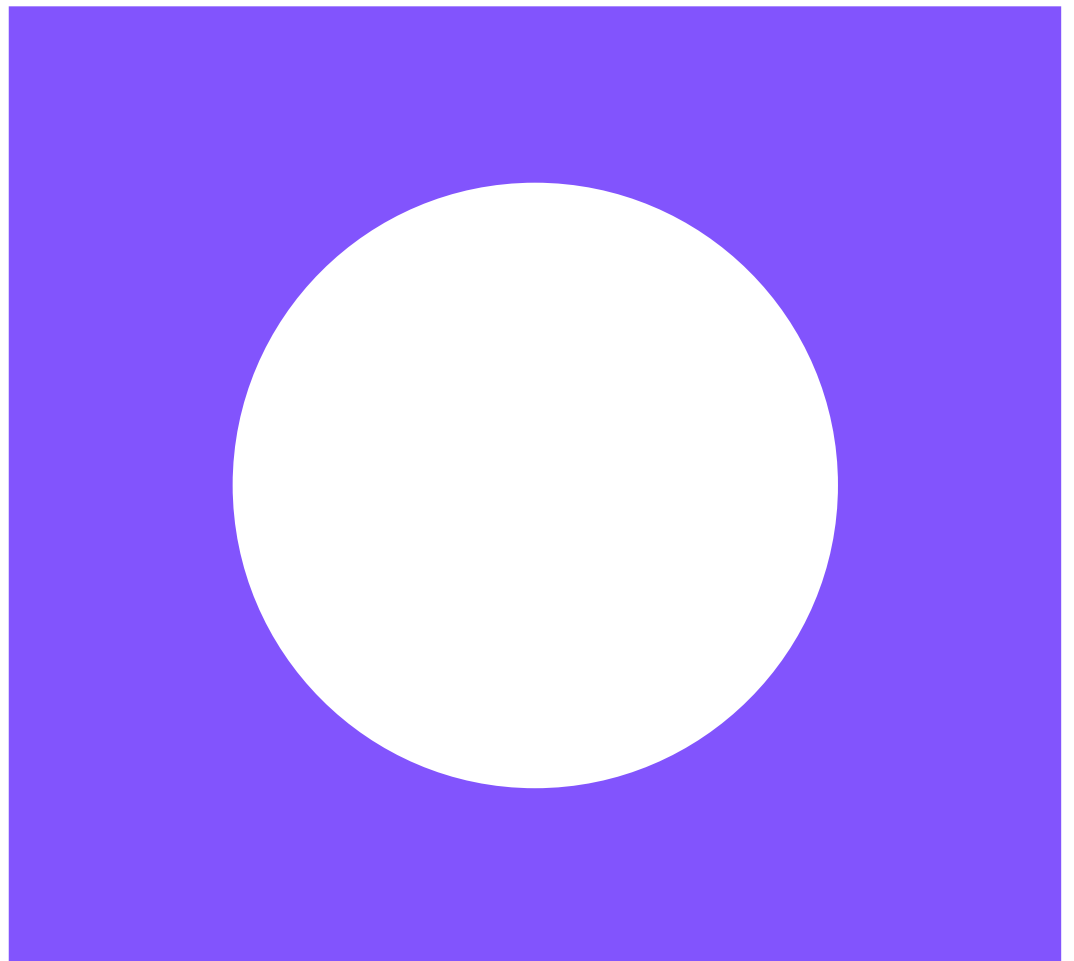
| Description of effect                                                                                     | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Residual effect | Proposed monitoring                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                           |                        |                         |                     |                                                     | <ul style="list-style-type: none"> <li>Skips are covered where appropriate.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |                                                                                                                                                                                                                                                                                                                                                                                                        |
| Health and safety hazards due to inappropriate handling and storage of waste particularly hazardous waste | Permanent              | Medium                  | Major               | Major adverse                                       | <p>Where practicable, it is required that:</p> <ul style="list-style-type: none"> <li>The existing operational WMP will be followed.</li> <li>Material management and storage are specially designed with the considerations detailed in section 13.6.</li> <li>PPE is provided to personnel where appropriate.</li> <li>There are procedures and training for correct handling and storage of hazardous materials.</li> <li>Materials are substituted with less hazardous or toxic materials, wherever possible.</li> <li>Transport of such materials are handled by appropriate and correctly authorised vehicles.</li> <li>Final disposal, where necessary, occurs at facilities that are correctly authorised.</li> <li>Spill Prevention Plan and EPRP for hazardous material management is created and followed.</li> </ul> | Negligible      | <p>Where practicable, it is recommended that:</p> <ul style="list-style-type: none"> <li>Periodic inspections of waste storage areas are conducted and findings documented.</li> <li>There are regular audits of waste segregation and collection practices.</li> <li>Any spillages/ leaks of hazardous materials/waste or other health and safety incidents are recorded and investigated.</li> </ul> |
| Pressure on existing landfill capacities                                                                  | Permanent              | Low                     | Minor               | Negligible                                          | <p>Where practicable, it is recommended that:</p> <ul style="list-style-type: none"> <li>Suppliers that use returnable, reusable, or practicably recyclable packaging are prioritised. Unused material is returned and packaging recycled where possible.</li> <li>Waste is appropriately segregated.</li> <li>Segregated point of generation bins are provided.</li> <li>The BPEO for the waste within the context of the waste hierarchy is implemented.</li> <li>Final disposal, where necessary, occurs at facilities that are correctly authorised.</li> </ul>                                                                                                                                                                                                                                                              | Negligible      | <p>Where practicable, it is recommended that:</p> <ul style="list-style-type: none"> <li>Periodic inspections of waste storage areas are conducted and findings documented.</li> <li>There are regular audits of waste segregation and collection practices.</li> </ul>                                                                                                                                |

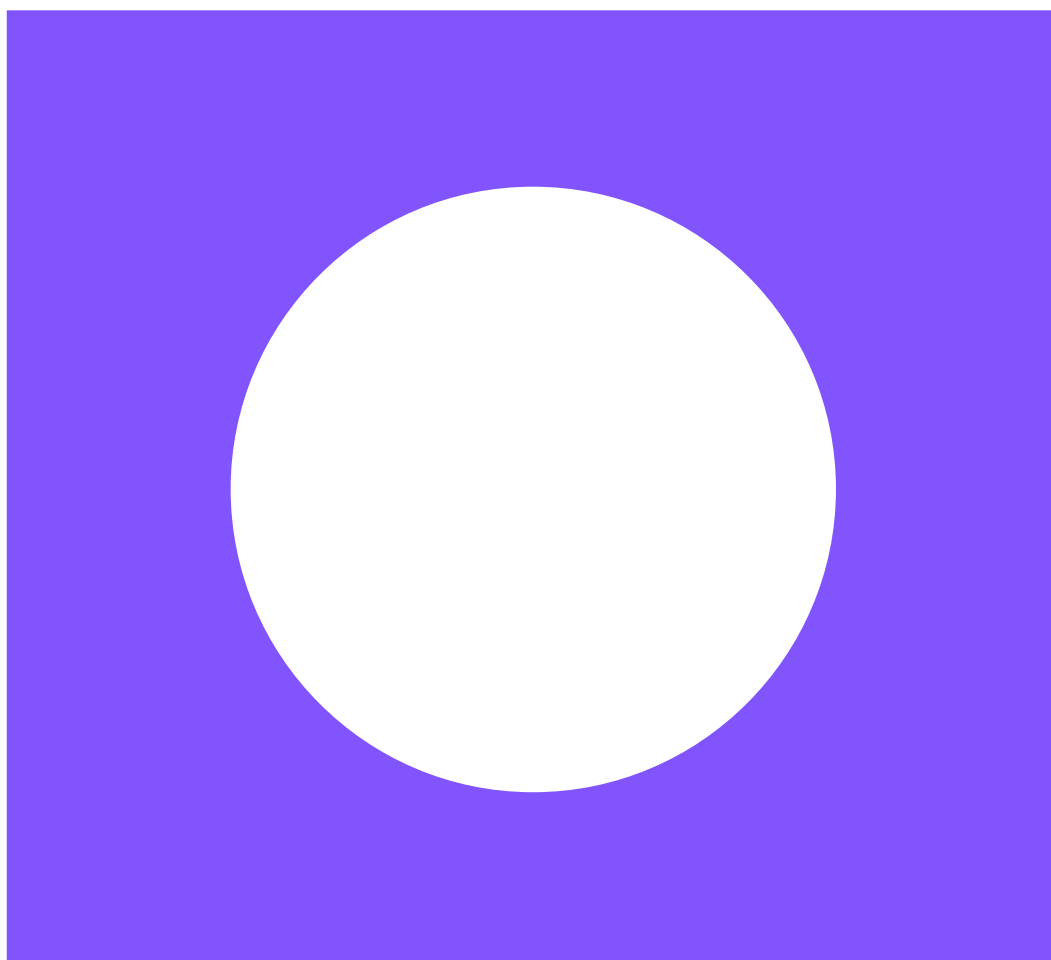
| Description of effect                                              | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                          | Residual effect | Proposed monitoring                                                                                                                                       |
|--------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Increased travelling from transporting waste from the Project site | Temporary              | Low                     | Minor               | Negligible                                          | Where practicable, it is recommended that: <ul style="list-style-type: none"><li>Transport of such materials are handled by appropriate and correctly authorised vehicles.</li><li>Chosen recycling or disposal facilities are located as close to ALA as possible.</li><li>When separate treatment or disposal facilities are required, these are in close proximity to each other.</li></ul> | Negligible      | Where practicable, it is recommended that: <ul style="list-style-type: none"><li>Relevant documentation is kept up to date a regularly checked.</li></ul> |

## Appendix 13.A: Site photos

### Storage of hazardous materials







# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 14

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 14**

September 2025

# Issue and Revision Record

| Revision | Date       | Originator | Checker | Approver | Description                                |
|----------|------------|------------|---------|----------|--------------------------------------------|
| A        | 31/07/2025 | ER         | CP      | KD/BM    | Draft report                               |
| B        | 05/09/2025 | JC         | CP      | KD/BM    | Updated report following external comments |
| C        | 12/09/2025 | SM         | KD      | BM       | Updated report with minor corrections      |
|          |            |            |         |          |                                            |
|          |            |            |         |          |                                            |
|          |            |            |         |          |                                            |
|          |            |            |         |          |                                            |
|          |            |            |         |          |                                            |

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# Contents

|                                                             |    |
|-------------------------------------------------------------|----|
| Acronyms and abbreviations                                  | 1  |
| 14 Water resources                                          | 2  |
| 14.1 Introduction                                           | 2  |
| 14.2 Methodology                                            | 2  |
| Applicable guidelines and standards                         | 2  |
| Area of Influence for water resources                       | 3  |
| Data collection                                             | 3  |
| Limitations and assumptions                                 | 3  |
| 14.3 Baseline                                               | 4  |
| Current baseline                                            | 4  |
| Future baseline                                             | 6  |
| 14.4 Potential impacts                                      | 6  |
| 14.5 Assessment of effects                                  | 7  |
| Construction phase effects                                  | 7  |
| Operational phase effects                                   | 8  |
| 14.6 Mitigation                                             | 9  |
| Construction phase                                          | 9  |
| Operational phase                                           | 10 |
| 14.7 Summary of residual effects                            | 11 |
| Tables                                                      |    |
| Table 14.1: ALA water consumption (2024)                    | 4  |
| Table 14.2: Summary of residual effects for water resources | 12 |
| Figures                                                     |    |
| Figure 14.1: Surface water features within the airport      | 5  |

# Acronyms and abbreviations

| Abbreviation /<br>Acronym | Definition                                       |
|---------------------------|--------------------------------------------------|
| ALA                       | Almaty International Airport                     |
| EBRD                      | European Bank for Reconstruction and Development |
| EHS                       | Environmental, Health and Safety                 |
| ESAP                      | Environmental and Social Action Plan             |
| ESIA                      | Environmental and Social Impact Assessment       |
| IFC                       | International Finance Corporation                |

# 14 Water resources

## 14.1 Introduction

14.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) reports the findings of an assessment of the likely significant environmental effects on the water environment as a result of the Project. The following water environment receptors and resources are considered in the assessment:

- Surface water including the localised impacts to the water quality (routine runoff and spillage) and hydromorphology
- Existing water resources receptors (abstractions and discharges)
- Groundwater – including water quality (routine runoff and spillage) and groundwater levels and flows
- Flood risk – including to people, property and infrastructure that could be at risk of flooding

14.1.2 An assessment of likely significant effects has been undertaken for each of the sensitive receptors identified in the study area. Where necessary, commitments to mitigation measures have been made to manage any impacts on receptors.

## 14.2 Methodology

14.2.1 This section of the ESIA chapter presents the methodology applied to the assessment of impacts. The assessment of potential water environment effects has been carried out in accordance with the methodology outlined in **ESIA Chapter 4: ESIA scope and methodology**, which includes sensitivity of the receptor, the magnitude of the potential impact, and the significance of effects.

### Applicable guidelines and standards

14.2.2 In addition to the applicable overarching policy and legislation for the Project that is presented in **ESIA Chapter 3: Policy, legal and institutional framework**, the following section presents further policy and legislation which specifically relates to water quality, hydrology and hydrogeology for the Project.

### International requirements

14.2.3 International guidelines relating to water environment are applicable to Kazakhstan. These are:

- European Bank for Reconstruction and Development (EBRD) Sub Sector Environmental and Social Guideline – Air Transportation, 2014<sup>1</sup>
- EBRD Environmental and Social Policy and Performance Requirements, 2024<sup>2</sup>
- International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability, 2012<sup>3</sup>
- IFC Environmental, Health and Safety (EHS) Guidelines: General Guidelines, 2007<sup>4</sup>

---

<sup>1</sup> EBRD (2014). Sub Sector Environmental and Social Guideline – Air Transportation

<sup>2</sup> EBRD (2024). Environmental and Social Policy and Performance Requirements

<sup>3</sup> IFC (2012). Performance Standards on Environmental and Social Sustainability

<sup>4</sup> IFC (2007). Environmental, Health and Safety Guidelines

- IFC EHS Guidelines: Airports, 2007<sup>5</sup>
- IFC EHS Guidelines: Construction and Decommissioning, 2007<sup>6</sup>

### Area of Influence for water resources

- 14.2.4 The Area of Influence for road drainage and the water environment covers a 1km radius around the Project. This relates to both surface water and groundwater. This study area has been determined based on professional judgement as pollutants are expected to disperse and have been diluted beyond a 1km radius. This study area may be extended where there are sensitive features (protected areas) that may be affected by contaminants transported downstream of the Project via surface waterbodies or ground waterbodies. However, based on the Project components, there are no sensitive receptors beyond the 1km study area that could be impacted. Therefore the study area was not extended.

### Data collection

- 14.2.5 A desk-based review of available information from national and international sources was undertaken. This included:
- Country Profile – Kazakhstan (Food and Agriculture Organisation of the United Nations, 2012)<sup>7</sup>
  - Municipal Water Services, Kazakhstan. Background Analysis for Financing Strategy (DEPA, 2001)<sup>8</sup>
- 14.2.6 Previous relevant reports which have been made available and reviewed for the purposes of this assessment include:
- Almaty International Airport ESIA Scoping Report (Mott MacDonald, 2022)<sup>9</sup>
  - Environmental & Social Review and Audit 8th Site Visit Report (Almaty International Airport, 2025)<sup>10</sup>
  - Spill response procedure and emergency response plan
  - Preliminary report on analysis of groundwater<sup>11</sup>

### Limitations and assumptions

- 14.2.7 This chapter has been prepared using publicly available surface and groundwater information for desk-based assessment. Third party surveys have been undertaken to support and validate (where applicable) this information. Where this has not been possible, it is assumed the information provided from public sources is correct and reflects baseline conditions.
- 14.2.8 In the absence of detailed mapping or formal designations of the underlying aquifers, the assessment is subject to a degree of uncertainty.
- 14.2.9 It has been assumed that the increase in wastewater generated will be within the capacity of the existing treatment works.

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<sup>5</sup> IFC (2007). EHS Guidelines: Airports

<sup>6</sup> IFC (2007). EHS Guidelines: Construction and Decommissioning

<sup>7</sup> United Nations (2012). Country Profile – Kazakhstan. Available at: [fao.org/aquastat/en/countries-and-basins/country-profiles/country/KAZ/index.html](http://fao.org/aquastat/en/countries-and-basins/country-profiles/country/KAZ/index.html). Accessed 07/07/2025

<sup>8</sup> DEPA (2001). Municipal Water Services, Kazakhstan. Background Analysis for Financing Strategy

<sup>9</sup> Mott MacDonald (2022). Almaty International Airport ESIA Scoping Report

<sup>10</sup> ALA (2025). Environmental & Social Review and Audit 8th Site Visit Report

<sup>11</sup> Preliminary report on analysis of groundwater (2025)

- 14.2.10 For the purpose of this assessment, it has been assumed that the increase in clean water demand will be within the current available water supply and no abstraction are required. If abstractions are required, then this ESIA chapter will need to be re-assessed.
- 14.2.11 To calculate the predicted water consumption, it is assumed the predicted percentage increase in passengers is equal to the percentage increase in water consumption. These uplifts have been applied to the 2024 water consumption data.
- 14.2.12 The following information was not available for this assessment:
- Information on the existing permitting for discharge from the airport.
  - A completed flood risk assessment, including data on current and historical flood risk to the airport and surrounding area. The assessment here provided is based on professional judgement in the absence of this data.
- 14.2.13 This may affect the validity of the baseline data and consequently impacts may be under or over estimated.

## 14.3 Baseline

### Current baseline

#### Water resources

- 14.3.1 According to information provided by Almaty International Airport (ALA), water supply to buildings within the site is sourced from the municipal supply. This includes both hot and cold-water supplies, with hot water distributed from central locations within the municipality. Consumption figures for 2024 are shown in Table 14.1.

**Table 14.1: ALA water consumption (2024)**

| Supply type  | Volume (m <sup>3</sup> ) |
|--------------|--------------------------|
| Cold water   | 367,149.71               |
| Sewage       | 391,954.97               |
| <b>Total</b> | <b>759,104.68</b>        |

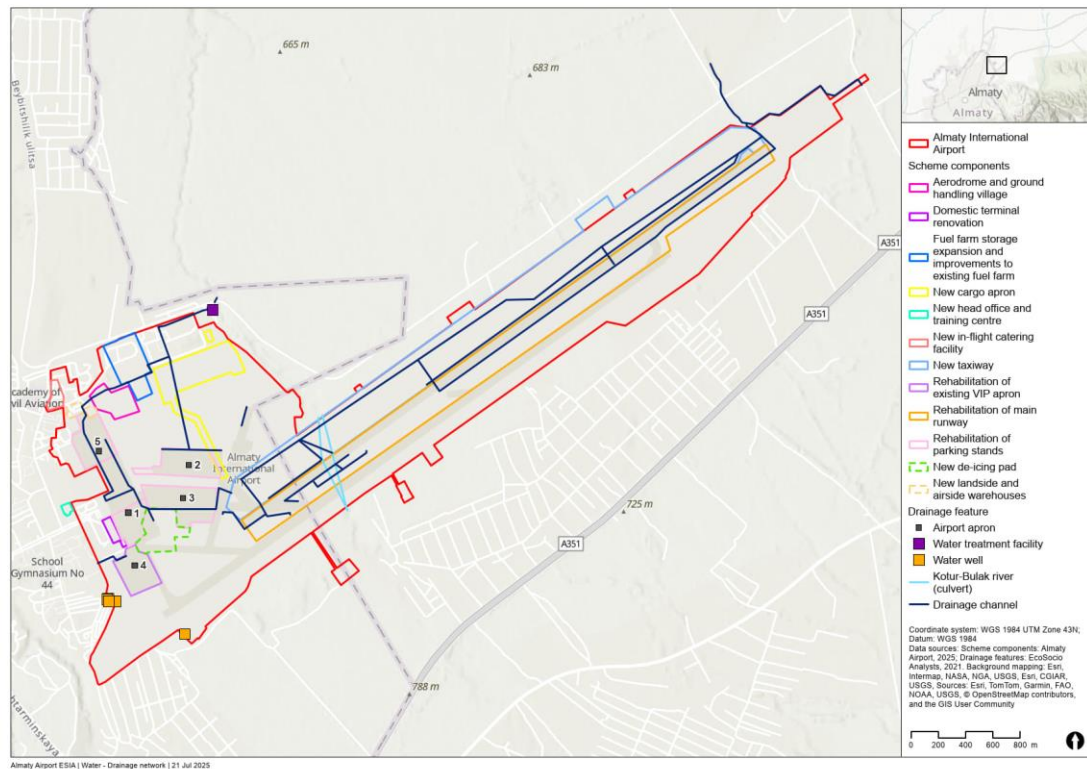
#### Wastewater and sludge

- 14.3.2 All wastewater produced at the airport, including foul water from airport buildings and blue water from aircraft, is discharged to sewer for treatment at the municipal wastewater treatment facility. Sludge produced from the cleaning of oil tanks at the fuel farm is retained in underground storage tanks which are emptied by a contractor who treats the waste offsite. There is no information on the structural condition of the tanks as they are not pressure tested. Secondary containment is not in place, and the tanks are located outside of the bunded area of the fuel farm.

#### Surface water – hydrology

- 14.3.3 The development falls within the Balkhash-Alakol River basin which covers an area of 413,000km<sup>2</sup> and is the second largest basin in Kazakhstan. The Malaya Almatinka River is situated to the west of the site, approximately 50m from the operational boundary of the airport at its closest point, and approximately 20m lower than the airport elevation. The Kotur-Bulak River flows northwards through a culvert beneath both runways approximately 1.8km east of the site of the new international terminal building, see Figure 14.1.

**Figure 14.1: Surface water features within the airport**



- 14.3.4 A large proportion of the site is covered with hard surfacing associated with the two runways, apron areas, two terminal buildings, and a range of operational and maintenance buildings and infrastructure, and associated hardstanding. It is assumed that all hard surfaces within the site are formed from impermeable materials.
- 14.3.5 Surface runoff within the site is managed through a network of covered drainage channels, which are lined with concrete and asbestos (see **ESIA Chapter 9: Geology and soils**), the layout of the channels is shown in Figure 14.1. The majority of the site is drained by channels which flow into the airport water treatment facility and the water is reused for internal purposes such as dust suppression and operational needs. It is anticipated that the discharge will eventually enter into the Kotur-Bulak river, as shown in Figure 14.1. However, the runway drainage channels drain to a sump and discharge into a drainage ditch outside of the airport boundary which flows north towards Almerek without passing through the onsite water treatment facility. Additionally, Apron 4, shown in Figure 14.1 drains to the west into the municipal drainage system. The surface water drainage channels are noted to be in poor condition.
- 14.3.6 Additional drainage from the apron areas within the airport site occurs via surface water runoff, which flows off the edge of the apron onto adjacent grassed areas, where it subsequently infiltrates into the ground through soakaway.

### Surface water – water quality

- 14.3.7 Contaminants may be present in surface water runoff from accidental spillages and activities at the airport, including ground handling vehicles, aircraft refuelling and combustion of aviation fuel. Contaminants sourced from these operations include hydrocarbon-based oil and lubricants, heavy metals, suspended solids and organic compounds. Further information on baseline surface water quality monitoring is provided in the ALA Environment Operating Reports for 2023 and 2024 (received July 2025).

## Groundwater

- 14.3.8 The site is located in the foothill plain of Zailiysky Alatau, the Northern Tien Shan geomorphological region of Central Asia. The Project area is expected to be underlain by a cover of made ground as part of the existing airport apron and construction materials associated with the existing buildings. Some small areas of soft landscaping are also present, which include some limited amounts of topsoil.
- 14.3.9 The underlying geology is reported by Environmental and Social Due Diligence report<sup>12</sup> for the site. The report states the underlying geology to comprise Quaternary age alluvial deposits which variably comprise loams, sandy loams, quartz-feldspar sands of various sizes and pebble (gravelly) soils.
- 14.3.10 The underlying soils are likely to contain useable groundwater resources (aquifers).
- 14.3.11 There are groundwater wells on site which have been used for firefighting operations in the past. Currently no abstraction from these groundwater sources takes place, and it is understood that there is no permit in place for groundwater abstraction from the site.
- 14.3.12 The groundwater levels near the fuel farm range from 1.1m to 3.4m below ground level.
- 14.3.13 It is understood that abstraction of groundwater by private companies takes place within the region, however, with water sourced from a confined aquifer at a depth of approximately 220m. The location of this abstraction is unknown. This was reported in the 2022 ESIA.

## Future baseline

- 14.3.14 For precipitation, projections indicate that summers will become drier in future, and winters wetter, as time progresses. In addition, the frequency of extreme weather events including intense precipitation events, and also drought events, will increase. It is possible that increases in intensity of rainfall during storm events may lead to an increase in flood risk by overwhelming the capacity of the existing surface drainage network and onsite water treatment plant, should no expansion be carried out. At present, there is no mechanism for controlled overflow should the capacity of the facility be reached. The tanks within the plant would be overtopped with uncontrolled flow of untreated water flowing north east towards and across the road.
- 14.3.15 Additionally, it is likely that the warming climate will impact the glacially fed Malaya Almatinka River. Following a period of increased glacial melt rates and higher flows due to temperature increases, flow rates are likely to decline due to a reduction in the availability of glacial ice at the source. Therefore, the discharge of treated or untreated surface water and wastewater is likely to be diluted to a lesser degree than at present, thus increasing concentration of contaminants within the watercourse which could negatively impact downstream ecosystems and users.
- 14.3.16 Further information can be found in **ESIA Chapter 7: Climate resilience**.
- 14.3.17 Using the total passenger numbers (2025) and water consumption values provided (2024) to estimate water use per passenger, the estimated water use demand is expected to increase by 122% by 2050 based on forecasted passenger numbers.

## 14.4 Potential impacts

- 14.4.1 The main potential construction impacts relating to the water environment are:
- Increased pollution from construction traffic and activities, hydrocarbons and other chemicals from accidental spillages for both surface water and groundwater receptors.

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<sup>12</sup> Waterman (2020). Almaty Airport Environmental and Social Due Diligence

- Dust emissions and deposition from land clearing, road works, extraction of material from quarries/borrow pits, material storage, loading/unloading/transportation of materials, wind blowing of stockpiles, etc., which impact deposits into the watercourses.
- Piling activities during construction may create vertical pathways through soil layers, increasing the risk of contaminated surface water or runoff infiltrating into underlying groundwater resources.
- Water demand for construction phase: workers, dust control by water spraying, other construction compounds.
- Increase in surface water runoff due to altered drainage through excavation.

14.4.2 The main potential operational impacts relating to the water environment are:

- De-icing fluid entering the watercourse and contaminating the surrounding environment
- Increase in surface water runoff due to additional paved surfaces.
- Potential for pollution pathways, allowing infiltration of contaminated water or runoff.
- Increase in pollution from airplanes and support vehicles (hydrocarbons and other chemicals) from accidental spillages.
- Rising passenger numbers over the Project's lifetime will increase consumption of drinking water, which could cause demand to exceed available water supply.

## 14.5 Assessment of effects

### Construction phase effects

#### Site surface drainage and flooding

- 14.5.1 There is likely to be an increase in temporary hardstanding and structures on site throughout the construction phase which may impact the current drainage pattern. Additionally, excavations required for the construction of the Project, installation of associated infrastructure, and laying of sub-surface services may adversely affect site drainage.
- 14.5.2 There is the potential for an increase in flood risk within the Project extent and the surrounding areas due to the potential for construction activities, which may temporarily alter the flow paths of the surface water or increase the amount of surface water runoff in localised areas. The sensitivity of the drainage ditch and Kotur-Bulak river are **medium**, and the magnitude of impact is **low**, which would result in a **minor adverse (non-significant) effect**.

#### Surface water quality

- 14.5.3 During the construction phase of the Project, it is likely that there will be an increase in traffic at the site due to the transport of materials and movement of construction plant. This will increase the risk of contamination of surface water by accidental spills, hydrocarbon-based oils and lubricants, heavy metals, suspended solids, and organic compounds. The sensitivity of the drainage ditch and Kotur-Bulak river are **medium**, and the magnitude of impact is **low**, which would result in a **minor adverse (non-significant) effect**.
- 14.5.4 As part of the construction phase, it is expected that significant amounts of dust will be created and re-settled. This process creates a substantial amount of material that will be mobilised through surface runoff and deposited in the drainage channels and surface water courses at points of particularly low flow, such as at culverts and reaches of thick vegetation. The siltation of the channels can cause flooding problems and reduce the volume of the drainage channels for transporting the resulting flow. The use of water as a dust suppression mechanism may further increase the sediment load entering the drainage channels and increase pressure on



local resources. The sensitivity of the drainage ditch and Kotur-Bulak river are **medium**, and the magnitude of impact is **low**, which would result in a **minor adverse (non-significant) effect**.

### Groundwater

- 14.5.5 During the construction phase of the Project, it is likely that piling (either temporary and/or permanent) will be required. Disturbance of the ground from piling could lead to disruption of natural groundwater flow paths by enabling water to move more easily between strata or by obstructing existing pathways. Shallow groundwaters are anticipated to be present underlying the Project. Ground and earthworks including compaction from heavy machinery, increased impermeable areas piling and excavations may also cause disruption to the shallow groundwater flow regime and recharge efficiency. The sensitivity of the groundwater is **medium**, and the magnitude of impact is **low**, which would result in a **minor adverse (non-significant) effect**.

### Water resources

- 14.5.6 Water usage during the construction phase will include supply for on-site personnel, dust suppression through water spraying, and operational needs within construction compounds and associated facilities. This will increase strain on the existing water supply infrastructure, which may not have capacity to meet future water demands. Information provided indicates the increased demand will be within the current available water supply, in addition, treated water will be reused on site for internal purposes such as dust suppression and construction needs, therefore there will be a negligible impact. The sensitivity of the drainage ditch and Kotur-Bulak river are **medium**, and the magnitude of impact is **negligible**, which would result in a **negligible (not significant) effect**.

### Operational phase effects

#### Water quality

- 14.5.7 An increase in the number of aircraft and support vehicles is expected to result in higher levels of pollution, particularly through routine surface runoff. This runoff, which may contain contaminants such as hydrocarbons and heavy metals, and will enter the nearby watercourses. In addition, there is a risk of the de-icing fluid entering the watercourse and contaminating the surrounding environment. Whilst the stormwater drainage pipe will collect stormwater runoff from taxiway TXY-B, there is still a risk of spillage of airplane fuel and de-icer fluids. These discharges could lead to the long-term degradation of surface water quality. The sensitivity of the drainage ditch and Kotur-Bulak river are **medium**, and the magnitude of impact is **moderate**, which would result in a **moderate adverse (significant) effect**.
- 14.5.8 In addition, the shallow groundwater levels indicate a high degree of vulnerability, as the limited depth between the surface and the water table offers minimal natural protection against surface-derived contaminants. This increases the potential for pollutants to infiltrate and impact groundwater quality. Further detail on the composition of de-icing fluids, fuel and oils can be found in the Preliminary Report on the results of analysis of soil and groundwater samples. The sensitivity of the groundwater is **medium**, and the magnitude of impact is **moderate**, which would result in a **moderate adverse (significant) effect**.

### Drainage

- 14.5.9 The existing main drainage network does not provide sufficient capacity to accommodate for the increase in stormwater discharge capacity. In addition, new infrastructure such as the de-icing pad, cargo apron and warehouses will increase stormwater runoff.

- 14.5.10 The increase in impermeable area may alter flow dynamics and potentially affect both the rate and direction of runoff into the drainage channel and rivers. As the drainage channels are culverted, the main flood risk will be surface water runoff. As the baseline flood risk is currently unknown and no hydraulic modelling has been undertaken to understand the impacts post Project, the impacts cannot be quantified. However, the percentage increase is expected to be <10% from the baseline, it is assumed that these changes will be minor. The receiving discharge quantities in the existing apron drainage network will decrease due to the construction of this new main apron drainage line.
- 14.5.11 The sensitivity of the airport is **medium**, and the magnitude of impact is **low**, which would result in a **minor adverse (non-significant) effect**.

### Water resources

- 14.5.12 Rising passenger numbers over the Project's lifetime are expected to increase the demand for drinking water. As the volume of passengers grows, so too will the need for potable water to support daily operations, sanitation, and passenger comfort. This growing demand will increase strain on the existing water supply infrastructure, which may not have capacity to meet future water demands. The estimated water use demand is expected to increase by 122% by 2050 based on forecasted passenger numbers. Information provided shows the increased demand will be within the current available water supply, therefore will be a negligible impact. The sensitivity of the drainage ditch and Kotur-Bulak river are **medium**, and the magnitude of impact is **negligible**, which would result in a **negligible (not significant) effect**.
- 14.5.13 Rising passenger numbers are expected to result in increased on-site wastewater production. This includes both domestic wastewater from terminal facilities and operational wastewater from cleaning, catering, and other support services. The volume of treated effluent discharged into the receiving watercourse will therefore increase with increased passenger numbers. It is anticipated the effluent will undergo treatment prior to discharge. The sensitivity of the drainage ditch and Kotur-Bulak river are **medium**, and the magnitude of impact is **negligible**, which would result in a **negligible (not significant) effect**.

## 14.6 Mitigation

- 14.6.1 This section presents mitigation measures to manage potential water feature impacts during construction and operation. The mitigation measures have been identified based on the potential impacts identified above.

### Construction phase

- 14.6.2 The assessment has shown that significant effects on water pollution could occur to surface waters and groundwater from a range of sources linked to the construction phase of the Project. This section describes specific mitigation measures that will be implemented to prevent and minimise these construction impacts. Preventative measures such as best practice site management and effective site planning/layout will be implemented to minimise the risk of any pollution incidents finding their way to the receptors. A range of remedial or suppressive methods will then also be applied to control these potential adverse activities. The following measures will be taken to reduce the risk of surface and groundwater contamination:
- Accidental spill prevention through implementing to Spill Response Plan
  - Compliance with rules of material storage and use, waste storage and its timely removal.
  - Use of the existing roads for material delivery
  - Work performed strictly within the construction site
  - Strict prohibition of vehicle washing outside of the specially equipped places.

- 14.6.3 The following dust suppression methods will be undertaken to reduce the amount of dust created:
- Minimising dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment
  - Minimising dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers
  - Implementing dust suppression techniques on unpaved roads, such as applying water or non-toxic chemicals to minimise dust from vehicle movements
  - No burning of waste materials shall be allowed
  - Planning land clearing, removal of topsoil and excess materials, location of haul roads, tips and stockpiles with due consideration to meteorological factors (e.g. precipitation, temperature, wind direction, and speed) and location of sensitive receptors
  - Designing, installing, and applying a simple, linear layout for materials-handling operations to reduce the need for multiple transfer points
  - Compacting and periodically grading and maintaining roads
  - Vegetating exposed surfaces of stockpiled materials.
- 14.6.4 Additionally, a water quality monitoring regime of both surface water and groundwater will be implemented during the construction phase and continued during the operational lifespan of the Project. Water samples will be obtained from the following locations:
- Wastewater treatment facility storage tanks, prior to reuse
  - Runway drainage sediment trap
  - Drainage ditch which the runway drainage discharges into (upstream and downstream of the point of discharge)
  - Kotur-Bulak River (upstream and downstream of the culvert).
- 14.6.5 The above-named water sampling areas should be used by the airport for their ongoing monitoring (as described further in the Environmental Social Management Plan). Furthermore, as defined by the previous Environmental and Social Action Plan (ESAP) for the Project, the following management plans will be developed that are of relevance to this chapter:
- Stormwater Management Plan
  - Spill Response Plan
- 14.6.6 The receiving discharge quantities in the existing apron drainage network will decrease due to the construction of this new main apron drainage line; in addition to the VIP and de-icing apron drainage networks, the existing cargo apron will be connected to this new drainage line as well. This will prevent the new drainage network intersecting the existing drainage line that connects the cargo apron to the (pre-treatment) storage facility.

## Operational phase

- 14.6.7 Preventative measures such as best practice site management and effective site planning/layout will be implemented to minimise the risk of any pollution incidents finding their way to the receptors (including those defined by the previous project ESAP). The following measures will be taken to reduce surface and groundwater contamination:
- Ensuring continued used of specific zones for loading and unloading (if concerning potentially polluting substances), including refuelling and maintenance of support vehicles. These areas should be impermeable where the collection and disposal of any spills or leaks can be done so easily.

- The water quality monitoring regime for both surface water and groundwater should be continued throughout the operational life of the Project. Should water quality monitoring return results outside of acceptable limits, appropriate remedial action should be carried out which may include removal of water via a wastewater tanker to a treatment facility, or appropriate disposal of affected sediment.
- To manage pluvial flood risk, site drainage and the existing culvert should be kept well maintained to prevent blockages that would reduce its effectiveness. This should also include a plan for managing discharge from the water treatment facility, should storage capacity be exceeded during intense storm events. A detailed flood risk assessment will be undertaken to improve the understanding of fluvial flood risk and associated operational risks to the airport more precisely (specifically from the Malaya Almatinka and Kotur-Bulak Rivers).
- In case of an emergency spillage accident, emergency pollution prevention plans will be maintained to the appropriate international standards, with training given to staff on how to use the kits as well as general environmental awareness training to all staff to encourage incident reporting if a potential problem arises.
- The management of de-icing fluids will be formalised through the design and construction of a dedicated de-icing pad. Further detail on the composition of the de-icing fluids can be found in the Preliminary Report on the results of analysis of soil and groundwater samples<sup>11</sup>. As part of the design, an oil-water separator is included in the de-icing apron drainage network directly downstream of the de-icing liquid collection tank. In addition to the oil interceptors, further treatment will be provided by a separate de-icing pad which will be constructed and operated using a separate reservoir to collect de-icing liquid waste, which will be treated by specialised 3rd party plant. Whilst the stormwater drainage pipe will collect stormwater runoff from taxiway TXY-B, there is still a risk of spillage of airplane fuel.
- It is recommended to treat this from the stormwater runoff from taxiway TXY-B before discharging to the outfall location. The oil-water separator will be installed upstream of the connection point of the grated drain to the main drainage network. Both the VIP apron drainage system and the de-icing apron drainage system will need to be connected to a main drainage network to transport the (treated) stormwater runoff to the stormwater storage facility.
- With regards to increasing consumption of water resources, it is recommended that the capacity of the municipal supply to ensure availability of water is established and that water saving measures should be incorporated throughout the Project, including but not limited to low flow taps and dual flush toilets.
- Any discharges to municipal wastewater treatment systems must be compliant with national legislation.

14.6.8 Full details of the proposed drainage plans must be made available at the detailed design stage.

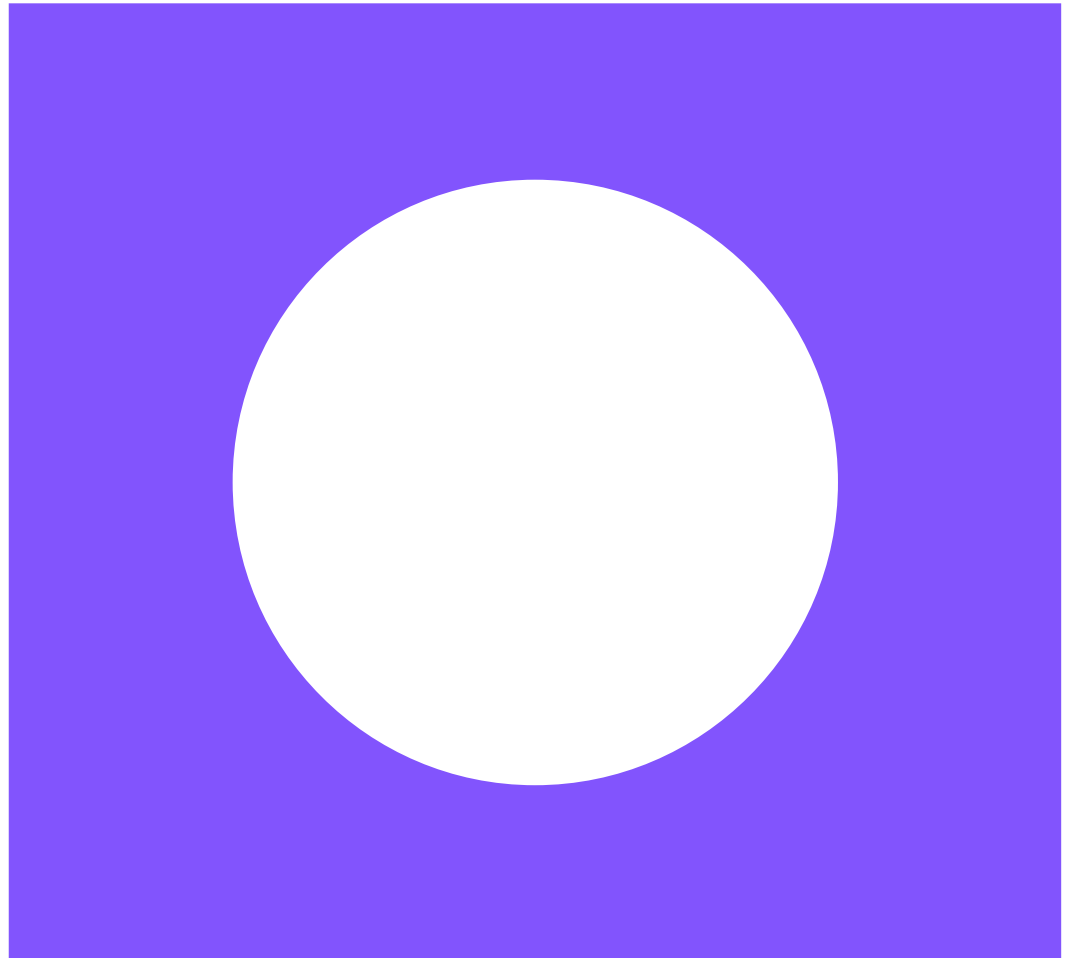
## 14.7 Summary of residual effects

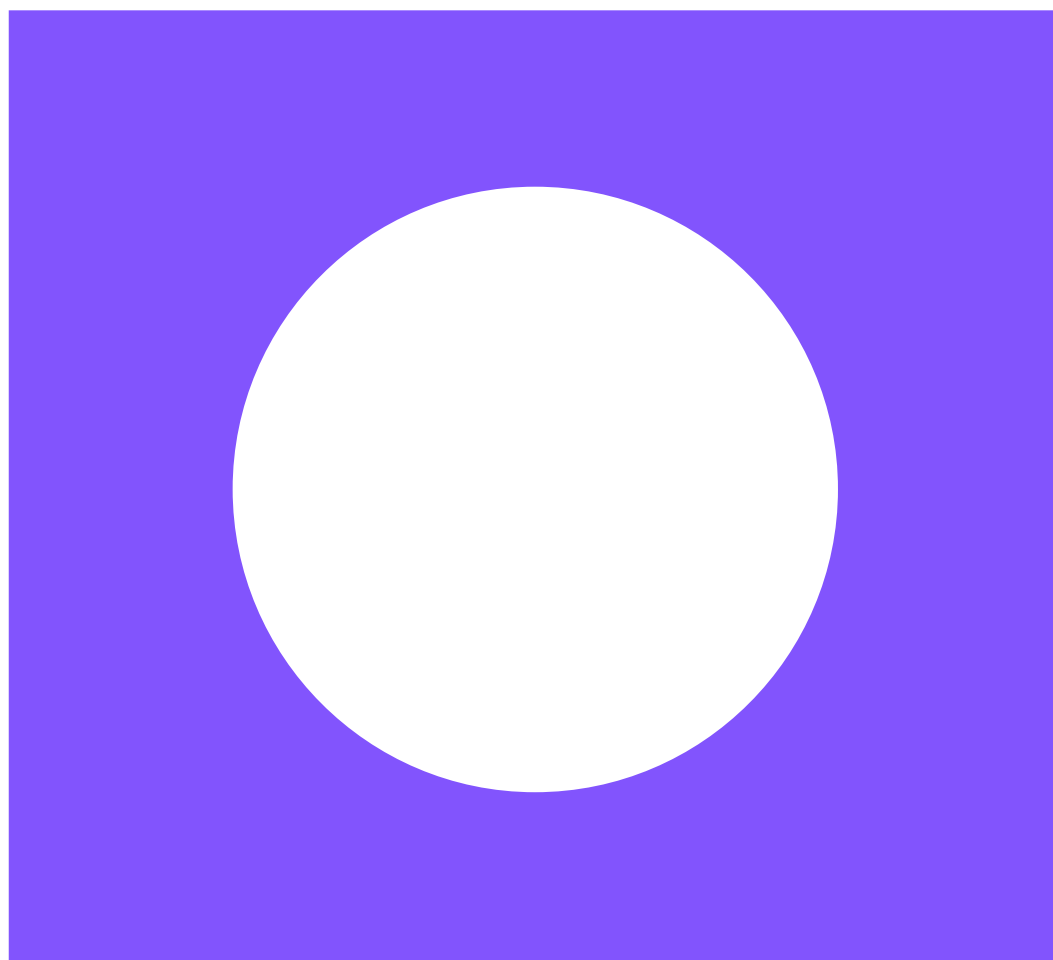
14.7.1 Residual effects are those that remain after mitigation and/or enhancement measures detailed in Section 14.6 have been implemented. Table 14.2 summarises the potential effects and any residual effects as a result of the Project.

**Table 14.2: Summary of residual effects for water resources**

| Description of effect                                                                                                                                                                                                                                                                                   | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Residual effect                 | Proposed monitoring                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction phase</b>                                                                                                                                                                                                                                                                               |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                                                                                                                                                            |
| Increase in flood risk due to the construction activities which alter flow pathways. A Stormwater Management Plan will be developed which is assumed to include flood risk.                                                                                                                             | Temporary              | Medium                  | Low                 | Minor adverse (not significant)                     | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Minor adverse (Not significant) | N/A                                                                                                                                                        |
| Increase the risk of contamination of surface water by accidental spills, hydrocarbon-based oils and lubricants, heavy metals, suspended solids, and organic compounds as well as dust. A Spill Response Plan will be developed.                                                                        | Temporary              | Medium                  | Low                 | Minor adverse (not significant)                     | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Minor adverse (Not significant) | Continued ground water quality monitoring within the fuel farm area. Implementation of surface water monitoring with agreed thresholds for each parameter. |
| <b>Operational phase</b>                                                                                                                                                                                                                                                                                |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                                                                                                                                                            |
| An increase in the number of aircraft and support vehicles is expected to result in higher levels of pollution, particularly through routine surface runoff. This runoff, which may contain contaminants such as hydrocarbons and heavy metals, and will enter the nearby watercourses and groundwater. | Permanent              | Medium                  | Moderate            | Moderate adverse (significant)                      | Treatment is required on the one taxiway that currently does not have any mitigation. In addition to the oil interceptors, further treatment is required to mitigate against de-icing fluids. This consists of a separate de-icing pad which will be constructed and operated using a separate reservoir to collect de-icing liquid waste. This will be treated by specialised 3 <sup>rd</sup> party plant. An inspection on the current drainage network is recommended to ensure no seepages into the ground. | Minor adverse (Not significant) | Continued ground water quality monitoring within the fuel farm area. Implementation of surface water monitoring with agreed thresholds for each parameter. |
| Increase in impermeable area, may alter flow dynamics and potential affect both the rate and direction of runoff.                                                                                                                                                                                       | Permanent              | Medium                  | Low                 | Minor adverse (not significant)                     | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Minor adverse (Not significant) | N/A                                                                                                                                                        |

| Description of effect                                                                                                              | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation | Residual effect | Proposed monitoring |
|------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|-----------------------|-----------------|---------------------|
| Increase in passenger numbers will increase drinking water supply                                                                  | Permanent              | Medium                  | Negligible          | Negligible                                          | N/A                   | Negligible      | N/A                 |
| Increase in passenger numbers will increase domestic wastewater which will be treated before being discharged into the watercourse | Permanent              | Medium                  | Negligible          | Negligible                                          | N/A                   | Negligible      | N/A                 |





# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 15

September 2025



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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 15**

September 2025

# Issue and Revision Record

| Revision | Date       | Originator | Checker | Approver | Description                                                      |
|----------|------------|------------|---------|----------|------------------------------------------------------------------|
| A        | 31/07/2025 | MM         | SS/MR   | KD/BM    | Draft report                                                     |
| B        | 04/09/2025 | MM         | SS      | KD/BM    | Updated report following external comments                       |
| C        | 12/09/2025 | SM         | KD      | BM       | Updated report with minor amendments following external comments |
|          |            |            |         |          |                                                                  |
|          |            |            |         |          |                                                                  |
|          |            |            |         |          |                                                                  |
|          |            |            |         |          |                                                                  |
|          |            |            |         |          |                                                                  |

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# Contents

|                                                                     |    |
|---------------------------------------------------------------------|----|
| Acronyms and abbreviations                                          | 1  |
| 15 Workers                                                          | 2  |
| 15.1 Introduction                                                   | 2  |
| 15.2 Methodology                                                    | 2  |
| Applicable guidelines and standards                                 | 2  |
| Area of influence                                                   | 3  |
| Methodological approach                                             | 3  |
| Limitations and assumptions                                         | 3  |
| 15.3 Baseline                                                       | 4  |
| Kazakhstan construction sector                                      | 4  |
| ALA employees                                                       | 4  |
| ALA workforce policies                                              | 5  |
| Contractor management                                               | 7  |
| Comparison of Kazakh labour laws and international labour standards | 7  |
| 15.4 Potential impacts                                              | 9  |
| Construction                                                        | 9  |
| Operation                                                           | 9  |
| 15.5 Assessment of effects                                          | 9  |
| Construction phase effects                                          | 10 |
| Operational phase effects                                           | 13 |
| 15.6 Mitigation                                                     | 14 |
| Construction phase mitigation                                       | 14 |
| Operational phase mitigation                                        | 15 |
| 15.7 Summary of residual effects                                    | 16 |

## Tables

|                                                                                                       |    |
|-------------------------------------------------------------------------------------------------------|----|
| Table 15.1: Summary of labour related grievances listed in the grievance mechanism from 2022-2025     | 5  |
| Table 15.2: High level gap analysis between Kazakhstan labour laws and PS2/ESR2 and ALA's HR policies | 8  |
| Table 15.3: Summary of residual effects for workers                                                   | 17 |

## Figures

|                                             |   |
|---------------------------------------------|---|
| Figure 15.1: Workers' assessment study area | 3 |
|---------------------------------------------|---|

# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                                                                           |
|------------------------|------------------------------------------------------------------------------------------------------|
| ALA                    | Almaty International Airport                                                                         |
| ATM                    | Air Traffic Movements                                                                                |
| E&S                    | Environment and Social                                                                               |
| EBRD                   | European Bank for Reconstruction and Development                                                     |
| EHS                    | Environment Health and Safety                                                                        |
| EPC                    | Engineering, Procurement and Construction                                                            |
| ESIA                   | Environmental and Social Impact Assessment                                                           |
| ESR                    | Environment and Social Requirements                                                                  |
| FIDIC                  | Fédération Internationale Des Ingénieurs-Conseils (International Federation of Consulting Engineers) |
| GBV                    | Gender-based violence                                                                                |
| GIIP                   | Good International Industry Practice                                                                 |
| HR                     | Human Resources                                                                                      |
| HSE                    | Health, Safety and Environment                                                                       |
| IFC                    | International Finance Corporation                                                                    |
| ILO                    | International Labour Organisation                                                                    |
| NGO                    | Non-governmental organisation                                                                        |
| OHS                    | Occupational Health and Safety                                                                       |
| OHSW                   | Occupational Health, Safety and Wellbeing                                                            |
| PPE                    | Personal Protective Equipment                                                                        |
| PS                     | Performance Standards                                                                                |
| TU                     | Trade Union                                                                                          |

# 15 Workers

## 15.1 Introduction

- 15.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) presents the baseline description and the findings of the assessment of the likely significant environmental effects on workers as a result of the Project.
- 15.1.2 An assessment of likely significant effects has been undertaken for each of the sensitive receptors identified in the study area. Where necessary, commitments to mitigation measures have been outlined to manage any impacts on receptors.
- 15.1.3 This chapter assesses how workers at Almaty International Airport (ALA) may be affected as a result of the Project in terms of the way they work and interact with one another on a day-to-day basis. Social impacts considered include those related to employment generation, labour and working conditions, and risks to the wellbeing and health and safety of ALA employees (direct workers), contractors' workers, and supply chain workers, recognising the different policies governing each of these categories of workers.

## 15.2 Methodology

### Applicable guidelines and standards

- 15.2.1 The assessment has been undertaken considering relevant legislation, standards, and guidance as summarised in the sections below. **ESIA Chapter 3: Policy, legal and institutional framework** outlines these relevant guidelines, however when addressing international standards from the prospective Lenders, this chapter will focus primarily on those related to labour aspects:
- International Finance Corporation (IFC) Performance Standards (PS)
    - PS1 – Assessment and Management of Environmental and Social Risks and Impacts
    - PS2 – Labor and Working Conditions
    - PS4 – Community Health, Safety and Security
  - The Environment and Social Requirements (ESR) of the European Bank for Reconstruction and Development (EBRD):
    - ESR1 – Assessment and Management of Environmental and Social Risks and Impacts
    - ESR2 – Labor and Working Conditions
    - ESR4 – Health, Safety and Security
  - International Labour Organisation (ILO) Conventions. Kazakhstan has ratified 25 core labour standards including C029 Forced Labour Convention, C087 Freedom of Association and Protection of the Right to Organise Convention, C098 Right to Organise and Collective Bargaining Convention, C100 Equal Remuneration Convention, C105 Abolition of Forced Labour Convention, C111 Discrimination, C138 Minimum Age Convention, C155 Occupational Health and Safety Convention, C182 Worst Forms of Child Labour Convention, C187 Promotional Framework for Occupational Safety and Health. The obligations under these conventions are implemented in national legislation.
  - Legal Framework: Labour Code, 2015
- 15.2.2 There is some overlap with the **ESIA Chapter 8: Community**. However, to prevent duplication, this chapter focuses on human (labour) activities, impacts and risks within the airport boundary

while **ESIA Chapter 8: Community** covers human and social aspects outside the airport boundary.

## Area of influence

- 15.2.3 The study area for this assessment is outlined in Figure 15.1, and considers the area of influence for where labour and work-related impacts and risks may be experienced during the construction and operational phases. Potential impacts and risks are identified for construction, which is estimated to take place for three years, and for operation, once the Project is complete and ALA experiences a growth of air and passenger traffic.

**Figure 15.1: Workers' assessment study area**



Source: YDA Accommodation Plan, 2025

## Methodological approach

- 15.2.4 This chapter has the objective of safeguarding workers by preventing or avoiding adverse impacts and risks. The assessment methodology aligns with the approach used in **ESIA Chapter 8: Community**, applying the same criteria for evaluating magnitude and receptor sensitivity. This analysis has been based on secondary data sourced from desktop reviews of existing Project documentation, relevant environmental and social studies, and publicly available information from national and local government bodies, as well as non-governmental organisations (NGOs).

## Limitations and assumptions

- 15.2.5 Current workforce data for ALA has been reviewed and incorporated into the assessment. However, projections for the future operational workforce, as well as up-to-date statistics on the construction sector workforce in the Almaty Region, are not publicly available. This limits the ability to fully assess long-term employment trends and cumulative labour-related impacts associated with the Project and other regional developments.

## 15.3 Baseline

### Kazakhstan construction sector

- 15.3.1 The local construction sector is growing fast both in Almaty and Almaty Oblast, at a rate of 121% and 117%, respectively, in 2019. At that time there were more than 1,208 construction organisations in Almaty and almost 150 construction businesses operating. Most construction operations in the region are private small and medium size businesses. According to national statistics, as of 2020, the 148 construction businesses in Almaty provided employment for approximately 48,069 people. While this remains the most recent employment-specific data available, more recent figures from 2023<sup>1</sup> indicate that the sector's output has continued to expand, with construction volumes in Almaty reaching 605.9 billion tenge (KZT) - an increase of 2.4% from the previous year. The construction sector of Almaty is mainly focusing on residential and non-residential buildings (like offices, sports, health and recreation facilities, hotels and restaurants, schools and education buildings, etc.) whereas the construction businesses in Almaty Oblast are mainly engaged in construction of roads and highways, non-residential buildings as well as assembling and installation operations.

### ALA employees

- 15.3.2 As of 2025, ALA employed 4,189 operational staff. Of the 4,189 employees, 2,292 are definite contracts and 1,897 are indefinite contracts. It is anticipated for the construction phase of the Project that a further 426 contracted workers will be required.
- 15.3.3 The operational staff functions include operation and maintenance of the airport and ground facilities, airfield servicing, managing flight safety for international and domestic air traffic, ornithological services, handling of luggage, cargo and mail, managing payload of aircrafts, provision of ground service for passengers, first aid and medical services for operational staff and passengers, operation of checkpoints and IT systems, security and video control, support of information enquiries and bookings, aviation staff training and improvement of skills.
- 15.3.4 Of the total staff from 2023, 116 people were parents with large families, while 35 people (1.9%) were disabled from working groups 2 and 3. People having disability group 2 (moderate disability) and 3 (mild disability) may work:
- Group 2: These disabled employees have a reduced working day (maximum 36 hours per week), do not work at hazardous workplaces, and have additional paid annual leave of 15 calendar days.
  - Group 3: These disabled employees are not restricted from employment but may need some adjustments based on medical recommendations. Employers must consider medical advice before assigning tasks.
- 15.3.5 The labour legislation sets out quotas for the share of people with disabilities in companies. As ALA employs over 250 people, employees with disabilities should make up 2-4% of the total staff. This target is not yet met by ALA (people with disabilities account for 1.9% of total staff in ALA). Any dismissals on grounds of disability are not allowed by law in Kazakhstan and such actions may lead to criminal liability. However, the labour agreement may be terminated with the disabled worker if the state of health does not allow for such worker to perform the labour functions in the relevant profession or may threaten the health of other people. In such a case an opinion from a specialist medical commission is to be sought before proceeding with the termination. On the other hand, a disabled worker may be made redundant on the same

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<sup>1</sup> On the execution of construction work and commissioning of facilities in the Republic of Kazakhstan (2023)



grounds as any other employee if retrenchment begins or if qualification is not sufficient or there are other grounds as set out in Article 52 of Kazakhstan's Labour Code.

- 15.3.6 As ALA is a large-scale employer it is subject to regular labour inspections. The only concern raised during such inspections in 2022 was regarding inspectors in the Aviation Safety Service who all did the same type of work but were paid differently according to their classification status. The notice was taken into consideration, classification was abandoned, and they then began receiving equal pay. ALA promotes collective bargaining and protection of workers' rights. A Trade Union (TU) Committee operates in ALA and 99% of employees are TU members and joined the Collective Agreement. As of 2025, ALA have undertaken a benchmarking exercise and are in the process of implementing a salary review and job title matrix to ensure equality of pay.
- 15.3.7 The Collective Agreement also establishes a grievance mechanism that is managed by the TU Committee. The most often cited complaints are regarding low pay. Complaints are voiced to the TU committee but there have been no written complaints in the last decade. The last written complaint was raised in respect of the quality of the workwear and was addressed avoiding reoccurrence.

**Table 15.1: Summary of labour related grievances listed in the grievance mechanism from 2022-2025**

| Grievance                                                                                                                                                                                                                                                                                                                                                                                           | Resolution                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Parking</b><br>ALA employees parking on local residents' yards.<br>Employees parking in residential areas.                                                                                                                                                                                                                                                                                       | Availability of shuttle buses covering six routes to Almaty and Almaty Region, to encourage employees to not rely on private vehicles and therefore decrease parking in the local proximity of the airport.                                                                                                                                                                           |
| <b>Waste</b><br>Garbage dumped in local vicinity of ALA and in local residents' yard's where employees are parking.<br>Waste is being dumped at Kyzyltu.                                                                                                                                                                                                                                            | ALA installed a barrier gate to prevent people dumping waste within ALA territory.<br>Further investigation is required regarding the dumping of waste and engagement with Akimat.                                                                                                                                                                                                    |
| <b>Working conditions</b><br>Working conditions and facilities fail to meet basic standards including the provision of a toilet, hygiene standards.<br>Concerns raised on the screening room and making this more private for employees.<br>Improve conditions for employees with disabilities.<br>Refuelling equipment does not meet international technical requirements, causing inefficiencies. | Management conducted a tour of the hangar to highlight the future project and where changes will be made.<br>Works completed to improve conditions of the screening room.<br>Plans to hire additional staff to provide assistance to those with disabilities.<br>Reports to management were made regarding the refuelling equipment and in some instances new equipment was provided. |
| <b>Pay increases</b><br>Requests to raise salaries to meet international standards.                                                                                                                                                                                                                                                                                                                 | All employee wages were raised by 20%.                                                                                                                                                                                                                                                                                                                                                |

## ALA workforce policies

- 15.3.8 ALA has a range of policies relating to their workforce and employment conditions. As part of Groupe ADP, the majority of these align with international standards on non-discrimination and equal opportunities, prohibition of child and forced labour, occupational health and safety (OHS) and training and professional development. All ALA employees will be subject to these policies. Contractors will have policies for their own employees (the contracted workers) which are in line with the Kazakhstan Labour Law, the ESR2, and ILO core labour conventions that Kazakhstan has ratified (refer to the methodology section) covering freedom of association and collective

bargaining, elimination of forced and child labour, elimination of discrimination, and occupational health and safety.

- 15.3.9 Section 9.3 of the ALA's Human Resources (HR) Policy outlines that employees may not be subject to discrimination in the exercise of labour rights based on origin, social, official and property status, gender, race, nationality, language, attitude to religion, belief, place of residence, age or physical disabilities as well as belonging to public associations. Section 9.5 of the ALA HR Policy outlines that ALA are committed to ensuring that women are not discriminated against, and that women are supported to take full advantage of opportunities on an equal basis with men.
- 15.3.10 The minimum age for a contract of employment established by the Labour Law is 16 years. In the event of completion of secondary education or leaving a comprehensive educational establishment, persons who have reached the age of 15 with written consent of their parents (tutor, guardian) can also be employed. A student may also be contracted to perform some light work, that is not harmful to their health and not interfering with their studies in their free from learning time. To be admitted to such work, a person must be 14 years of age and have the consent of a parent, tutor or guardian. Employment of persons under the age of 18 for heavy manual work and work involving harmful and/or dangerous conditions of labour is forbidden by the Labour Law.
- 15.3.11 Forced Labour is work or service which is extracted from a person under the menace of a penalty and for which the person has not volunteered. Common indicators of forced labour that appear in the construction industry include recruitment deception, isolation or restriction of movement from employer provided accommodation, retention of identity documents, intimidation and threats, late or incorrect wage payment, excessive overtime, debt bondage (from forwarding too much future salary), and abusive working conditions. The Kazakhstan Constitution guarantees basic rights, including freedom from forced labour. The Labour Code regulates labour safety, and the Penal Code criminalises human trafficking.
- 15.3.12 ALA has policies in place relating to child and forced labour risks, however they only cover direct workers. These policies are expected to be passed to contractors, subcontractors and within the primary supply chain.
- 15.3.13 The ALA HR Policy covers sexual harassment, grievance mechanisms, and other employment processes. Training is required for all new members of staff. A digital survey of workers in 2023 revealed that 78% of ALA respondents said that they were aware of the HR Policy and 55% of respondents said they were familiar with the content of the HR Policy. Only 48% of ALA employees said they had access to a copy of the HR Policy. In 2023 new policies were introduced regarding bonus payments, ethics, and code of conduct.
- 15.3.14 ALA has disclosed publicly its grievance mechanisms for workers and the community setting out the grievance submission process and how the grievance will be handled. Previous grievances raised by the workforce in 2023 and 2024 at ALA include grievances around repairing and upgrading working spaces, and conditions for the workforce to take a break, alongside requests for wage increases.
- 15.3.15 Section 8.1 of the HR Policy outlines that the Company provides a safe and healthy working environment, taking into account inherent risk in the airport construction sector and specific classes of hazards in airport construction, including physical, chemical, biological and radiological hazards and specific hazards to women. ALA also follows Health, Safety and Environment (HSE) regulations regarding accidents and investigation management. The records of fatalities and injuries are properly maintained and documented.
- 15.3.16 The ALA Training, Retraining and Professional Development policy states ALA's commitment to providing equal opportunities for professional growth and development irrespective of gender.

The ALA HR Policy outlines ALA's clear commitment to hiring and promoting the best employees without consideration of their age, race, gender, religion, creed or nationality. It is understood that the Training Policy was updated at the end of 2024 to include diversity and inclusion topics. All ALA employees, including contracted workers, will be subject to ALA policies including the Training Policy.

## Contractor management

- 15.3.17 ALA will be using a FIDIC contract for the construction works. FIDIC is the acronym for the International Federation of Consulting Engineers and its French name *Fédération Internationale Des Ingénieurs-Conseils*, which is a good international industry practice type of contract. FIDIC contracts protect labour rights primarily by mandating adherence to applicable laws, requiring adequate and timely payment to contractors and subcontractors, and providing for insurance for the contractor's personnel. While labour rights are not explicitly detailed, contract clauses on compliance with laws, financial arrangements, and insurance help promote fair treatment and safety for workers. In terms of consequences of non-compliance, if a contractor persistently violates labour laws or fails to meet payment obligations to workers, it can be considered a default, allowing the employer to terminate the contract.
- 15.3.18 The particular conditions of the contract also reference the IFC and EBRD environment and social (E&S) policies which also have performance standards and requirements for labour management and working conditions to cover direct, contracted and primary supply chain workers. As part of the ADP Group subsidiaries, ALA complies with the Group Code of Conduct<sup>2</sup>, which covers all employees, as well as third parties, including their suppliers, partners, and customers, to work ethically and legally. Also, ALA complies with TAV's Supply Chain Policy<sup>3</sup>.
- 15.3.19 Provision of international funding comes with specific needs for internal and independent monitoring of E&S performance, including for labour. Each company will be required to monitor its own working conditions, the main contractors will monitor labour management and working conditions of their subcontractors and service providers. ALA staff will also monitor the labour management and working conditions of contracted workers. Independent E&S monitors will be contracted to visit site regularly throughout the construction activities to verify the monitoring results.

## Comparison of Kazakh labour laws and international labour standards

- 15.3.20 Kazakhstan's labour laws show partial alignment with International Standards such as the ILO. Below indicates where Kazakhstan's labour laws align with International Standards:
- **Employment contracts:** The law mandates formal employment contracts and outlines procedures for termination.
  - **Working hours and rest breaks:** Standard working hours are 40 hours per week, typically spread over five eight-hour days. Employees are entitled to rest and have meal breaks of at least 30 minutes which are not counted as part of working time. Overtime must be agreed upon in advance with the employer, except for in emergency circumstances. Overtime is limited to a maximum of two hours per day.
  - **Antidiscrimination:** Kazakhstan's labour law prohibits discrimination across key employment areas, including hiring, promotion, compensation, and termination.

<sup>2</sup> [policy-ethics-compliance\\_c884f6ab-e7df-4627-9cc6-e3cf3b78e7f3.pdf](#) and [Code de conduite Anglais 2023](#)

<sup>3</sup> [policy-supply-chain-policy\\_9533710a-f994-40c3-a19c-8d1762028dd1.pdf](#)

- **Workplace safety standards:** Employers are required to conduct risk assessments and provide protective equipment, ensuring compliance with international occupational health and safety standards.
- **Dispute resolution mechanisms:** The law provides multiple methods for resolving labour disputes to support a fair and accessible resolution process for all.

- 15.3.21 Kazakhstan's labour legislation demonstrates broad alignment with key principles of IFC PS2 and EBRD ESR2, particularly in its foundational protections for workers. The Labour Code mandates written employment contracts, regulates working hours and rest periods, and prohibits child and forced labour, core requirements under both international standards. Provisions for occupational health and safety are established, with legal obligations for employers to ensure safe working conditions, which aligns with the general duty of care expected under PS2 and ESR2. Additionally, Kazakhstan law includes basic anti-discrimination clauses and recognises the right to collective bargaining, reflecting the international emphasis on fair treatment and freedom of association. While implementation and enforcement challenges remain, the legal framework provides a solid basis for compliance with many of the structural expectations of lenders.
- 15.3.22 The table below identifies gaps in national and regional labour laws within Kazakhstan, or where insufficient information is available to determine if these laws are implemented. The analysis includes a gap summary and risk assessment of how ALA's labour-related policies align with these legal provisions and with the PS2 and ESR2 requirements, highlighting areas where Kazakhstan's legal framework diverges from international lender expectations on labour and working conditions.

**Table 15.2: High level gap analysis between Kazakhstan labour laws and PS2/ESR2 and ALA's HR policies**

| Topic                         | Kazakhstan Labour Law                                           | IFC PS2 / EBRD ESR2                                                             | Gap summary and risk assessment                                                                                                                                               |
|-------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Written Employment Contracts  | Required, but not always comprehensive or consistently enforced | Mandatory, with clear terms on wages, hours, benefits, and rest periods         | There are gaps in regional standards including, consistency, clarity, and accessibility of contracts whereas ALA has written employment contracts.                            |
| Occupational Health & Safety  | Covers physical safety; mental health is minimally addressed    | Requires safe working conditions; psychosocial risks encouraged to be addressed | Limited mental health provisions; psychosocial risks not systematically managed both regionally and at ALA.                                                                   |
| Sexual Harassment Protections | No specific law; draft legislation exists                       | Requires non-discrimination and grievance mechanisms                            | Lack of legal protection and formal procedures regionally and at ALA.                                                                                                         |
| Child and Forced Labour       | Prohibited, but enforcement can be weak                         | Strictly prohibited; includes due diligence on recruitment practices            | Enforcement and monitoring mechanisms may be insufficient regionally. ALA has no workers under the age of 18.                                                                 |
| Grievance Mechanisms          | Not systematically required or implemented                      | Mandatory, accessible, and transparent grievance systems                        | Absence of formal, accessible grievance procedures regionally. At ALA, there is a formal grievance process, however there may be gaps in the management of the grievances and |

| Topic                                  | Kazakhstan Labour Law                      | IFC PS2 / EBRD ESR2                                         | Gap summary and risk assessment                                                                                                                                           |
|----------------------------------------|--------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        |                                            |                                                             | completion of these complaints.                                                                                                                                           |
| Equal Opportunity & Non-Discrimination | Basic anti-discrimination laws exist       | Requires proactive policies and fair employment practices   | Limited scope and enforcement of non-discrimination protections regionally. ALA have a commitment to non-discrimination but limited scope on protections and enforcement. |
| Supply Chain Labour Standards          | Not covered                                | Requires assessment of labour risks in primary supply chain | No legal requirement to assess or manage supply chain labour risks regionally and there is limited scope available to determine this for ALA.                             |
| Monitoring & Enforcement Capacity      | Limited inspection authority and resources | Requires effective monitoring and compliance systems        | Weak enforcement infrastructure and capacity regionally and at ALA.                                                                                                       |

## 15.4 Potential impacts

15.4.1 Below is a summary of the identified potential impacts on workers during both the construction and operational phases of the Project. These impacts are assessed in more detail below within Section 15.5.

### Construction

- Increase in temporary employment opportunities during the construction phase
- Occupational health, safety and wellbeing risk to construction workers
- Potential influx of non-local workers during construction
- Increase in noise, dust and construction related traffic with potential risk of impacts on the workplace environment for existing workers

### Operation

- Increase in permanent employment during the operational phase
- Occupational health, safety and wellbeing risk to operational workers

## 15.5 Assessment of effects

15.5.1 This section presents the assessment of labour impacts and risks for the construction and operational phases. As mentioned in **ESIA Chapter 8: Community**, an impact is an economic, social, environmental, and other consequence that can be reasonably foreseen and measured in advance if a proposed action, such as project construction, is implemented. An environmental and social risk is an uncertain event of unknown probability. The risks identified below, namely occupational health and safety, and security and wellbeing of construction and operational workers are informed by an assessment of the contextual elements that will contribute to the risks. Significance is not attributed to the risks but management measures, in particular preventative actions, are identified.

## Construction phase effects

### Temporary employment opportunities

- 15.5.2 **ESIA Chapter 2: Project description** identifies the fourteen components that are part of the Project. Various engineering, procurement and construction (EPC) contractors will be required. To date YDA, an international construction company based out of Turkey, has been appointed to act as the EPC Contractor for the runways, aprons de-icing pad and parking stands. YDA's construction works for the Project are anticipated to start shortly and to be completed by the end of 2028, using the full 30-month construction phase as outlined in **ESIA Chapter 2: Project description**. Their work covers the longest period. The other EPCs will be appointed in the coming months and will have smaller parcels of work.
- 15.5.3 The majority of construction work for all the EPCs will not take place in areas that are accessible to the public. The EPC contractors will be contractually required with appropriate method statements to adhere to national laws and good international industry practice.
- 15.5.4 Currently YDA is planning that 426 workers will be required for their construction activities. Of these jobs, 360 (85%) will be locally sourced workers residing within the Almaty Region. The number of construction workers required by other EPCs is currently unknown but could be a similar total.
- 15.5.5 Normal working hours in Kazakhstan are eight hours per day with one-hour lunch breaks, working 08:00 to 17:00 Monday to Friday. If special activities are required to take place outside of those hours these situations need to be agreed with the relevant authorities in advance on a case-by-case basis. Night-time working on site will not be allowed except for transportation of the main equipment.
- 15.5.6 A key social effect will be the provision of income for workers and their families contributing to their wellbeing and enhancing their quality of life. Whereas migrant or international workers (for instance from other parts of the country or, for YDA, from Turkey) will tend to send remittances to their families thereby injecting money into other localities, the local jobs will contribute to the economic development in the Project's direct and wider social areas of influence.
- 15.5.7 This impact is expected to be **minor** in magnitude as approximately 360 up to 700 temporary jobs for the workforce are made available during construction for a period of three years. As Almaty City and Almaty Region is a thriving metropolis, the amount of construction jobs is not considered large. The sensitivity of construction workers is considered **medium** as construction workers living in urban environments may have access to alternative employment opportunities and the magnitude is **minor** because of the number and duration, which would result in a **minor beneficial (not significant)** impact.

### Risks to workers' occupational health, safety and wellbeing (OHSW), and labour rights during construction

- 15.5.8 Local construction workers will most likely be employed based on fixed-term labour contracts related to the duration of the works by contractors, sub-contractors, and service providers.
- 15.5.9 The principal living arrangements will be for local workers to stay in their own homes. A smaller number (currently known to be 15% of YDA workers who are non-local i.e. national or international), will rent accommodation. Currently YDA does not anticipate building a camp for accommodating workers, rather its plan indicates it will rent accommodation in an area approximately 10km from the Project site for its international staff. The decision to use rented housing is based on the Project taking place in a large population centre with good quality housing stock and the capacity of the urbanised environment and infrastructure to assimilate this new workforce.

- 15.5.10 The ability for the majority of the YDA workforce to live in their own homes and with their own families is preferable to workers. It allows construction work to begin immediately and avoids accommodation not being ready on time such that workers need to move around or make their own rental arrangements which has can lead to anti-social behaviour<sup>4</sup>. As well, in this case, because of the size of Almaty, it also avoids making undue increased demands on local infrastructure, services and utilities, or contributing to inflation in local rent and other subsistence items with detrimental consequences for the local population.
- 15.5.11 The construction sector does present some potentially adverse risks to workers related to their terms of engagement and relationships with their employers. Employment risks may be associated with the following: insufficient, late or non-payment of wages; use of excessive overtime; lack of contract or insufficiently documented contract conditions; poorly managed end of contract terminations; and non-payment at the end of the construction phase. There are also risks of mistreatment by management, failure for companies to adequately respond to worker grievances, and risks for international workers in regards of visas and work permits.
- 15.5.12 The workers most vulnerable to labour rights breaches are:
- Those working for contractors or subcontractors with little formal knowledge of the labour law or the international standards
  - Lower skilled, young and less literate workers
  - Shift workers (security, canteen, cleaners, and drivers)
  - Workers further down the contracting tier
  - Female and other workers who may also face risks related to gender-based violence (GBV)<sup>5</sup>
- 15.5.13 In accordance with IFC PS2 and EBRD ESR2, the Project recognises the importance of identifying and managing occupational health and safety risks to workers during construction. Workers may be exposed to a range of physical hazards (e.g. working at height, noise, vibration, manual handling, and operation of heavy equipment), chemical hazards (e.g. dust, fumes, solvents, and fuels), and biological hazards (e.g. exposure to wastewater, vector-borne diseases, or contaminated materials). These risks will be addressed through the implementation of a comprehensive OHSW management plan, in line with national legislation and international standards. Measures will include hazard identification, risk assessment, training, provision of appropriate personal protective equipment (PPE), emergency preparedness, and health surveillance, with the aim of preventing incidents and promoting worker wellbeing. Risks relating to land contamination are discussed in **ESIA Chapter 9: Geology and soils**.
- 15.5.14 As mentioned in the methodology section, no significance is attributed to workers' OHSW risks, but management measures are identified.

### Project induced in-migration

- 15.5.15 Project induced in-migration can occur when people hear about large projects and potential employees and others move into the area. However, on this Project the required labour force

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<sup>4</sup> Antisocial behaviour refers to behaviour that would not customarily be accepted in society such as substance abuse that causes accidents, prostitution, criminality, theft, domestic violence, human trafficking, teenage pregnancy, inappropriate or illegal exploitation of natural resources, etc.

<sup>5</sup> GBV is defined by the IFC as: "an umbrella term for any harmful act that is perpetrated against a person's will and that is based on socially ascribed gender differences. GBV includes acts that inflict physical, mental, sexual harm or suffering; threats of such acts; and coercion and other deprivations of liberty, whether occurring in public or in private life. GBV disproportionately affects women and girls across their lifespan and takes many forms, including sexual, physical, and psychological abuse. It occurs at home, on the streets, in schools, workplaces, farm fields, and refugee camps; during times of peace as well as in conflicts and crises." (IFC Good Practice Note: Addressing Gender Based Violence in Investment Project Financing Involving Major Civil Works', 2018)

numbers are not large and much of the workforce will be sourced locally from Almaty City and the Almaty Region.

- 15.5.16 An accommodation plan has been developed by YDA, indicating that it intends to house workers sourced from a greater distance and any international EPC staff in rented accommodation, 10km from the airport site. As well, its workers will be provided with three meals a day at the accommodation site. The staff will be transported to the site by shared minibuses or private vehicles. The accommodation plan outlines there will be a security gate within the workers accommodation site and one security manager across the Project for the construction phase. In addition, there will be 24-hour security in place during construction for managing access by the general public.
- 15.5.17 Accommodation must meet the requirements set out in the 2009 Workers' accommodation processes and standards by the IFC and EBRD. Its requirements cover:
- Standards for rooms (size, number of people in a room), as well as accessible kitchen, toilets, washroom, kitchen, canteen, laundry, medical and leisure facilities
  - Adequate ventilation and temperature control for the local climate
  - Regular cleaning and pest control
  - Privacy measures in place e.g., all doors and windows to be lockable, curtains for rooms, shower cubicle curtains or doors, separate sleeping areas by gender, protection against theft
  - Adequate number of first aid kits available
  - Nutrition and food safety standards
  - Accommodation management and security plans, policies and procedures in place
  - Residents have freedom of movement and association
  - Mechanisms in place for reporting facility maintenance and behaviour issues
- 15.5.18 As the number of non-local workers is small (for instance 15% of the YDA workforce), this induced in-migration will not pose a risk of pressure and strain on the local social infrastructure, such as hospitals and health centres during construction. YDA's staffing schedule includes the provision of one doctor, one nurse and two first aiders, which will also help to alleviate any strain across local social infrastructure.
- 15.5.19 This impact is expected to be **minor** in magnitude due to the majority of the workforce being sourced locally across the Almaty Region and the provision of the accommodation site. The sensitivity of the host community is **low** (there is resilience to cope with the influx) so the effect is **minor adverse (not significant)**.

#### **Increase in noise, dust and construction related traffic**

- 15.5.20 Construction can cause increased noise and air pollution due to increased traffic movements, dust, and other impacts of construction activities. Construction workers and existing operational staff are potentially vulnerable to OHS hazards associated with construction activities. The following safety risks and hazards are typical of construction sites:
- Traffic, exposure to weather factors and extreme weather, noise, work in confined spaces, trenching, contact with power lines, falls from machinery or structures, and risk of falling objects
  - Exposure to emissions during construction and paving activities; including dust, and exhaust emissions from heavy equipment and motor vehicles during construction and maintenance

Within **ESIA Chapter 11: Noise**, **ESIA Chapter 5: Air quality** and **ESIA Chapter 12: Traffic and transport**, there are no identified significant effects during the construction period if all outlined mitigation within these chapters is implemented. However, the noise level is expected to increase across the site during construction, the dust nuisance from construction activities is



anticipated to increase, and there is an expected increase in traffic which will also potentially contribute to an increase in noise levels. It is highlighted that these effects will be more likely to be experienced during the construction of the new runway. As a result, suitable mitigation as outlined within **ESIA Chapter 11: Noise**, **ESIA Chapter 5: Air quality** and **ESIA Chapter 12: Traffic and transport**, including noise optimised construction equipment, the implementation of a CEMP and CTMP, should be followed to minimise any related impacts on workers.

15.5.21 The YDA staffing schedule indicates that eight of its workers will be health and safety staff, which is slightly less than the good international industry practice target of one per 50 workers. Workers who are more susceptible to OHS incidents and will require more mentorship and supervision are:

- Young and new workers
- Workers who are frequently lifting heavy objects
- Workers involved in repetitive work tasks
- Construction workers who receive poor PPE (for instance flimsy gloves which do not protect fingers), or pay less attention to safety briefings

15.5.22 As mentioned in the methodology section, no significance is attributed to workers' OHSW risks, but management measures are identified.

## Operational phase effects

### Employment opportunities during operation

15.5.23 Employment generated during the operational phase will mainly be permanent, and of a longer-term nature compared to that of the construction phase. Once operational, the Project will offer new skilled and unskilled jobs as a result of the increased passenger and air traffic. As of June 2025, a staffing plan had been developed and ALA was recruiting for almost 400 new positions. Almost 50% of new positions are within the ground handling department as a result of the predicted increase in passenger numbers. ALA is projected to handle approximately 12.3 million passengers (5.5 million from international traffic and 6.8 million from domestic traffic), approximately 1 million more than it handled in 2024. It is also projected to handle 10,400 cargo Air Traffic Movements (ATMs).

15.5.24 The Project plans to recruit most operational personnel from Almaty. The Project's operational staff functions will include operation and maintenance of the Project and ground facilities, flight safety for the increasing international and domestic air traffic, provision of ground service for passengers, baggage handling, cargo and mail, operation of checkpoints and IT systems, support of information enquiries and booking, aviation staff training and improvement of skills.

15.5.25 The new jobs created will provide specialist skills development opportunities, offering on-the-job training and skills improvement programmes. As part of the Project, a new head office and training centre will be built for utilisation by ALA employees.

15.5.26 Recruitment measures will include advertising new positions available in the terminal via the airport website and employment centres. This will be supported by the development of a Disability Inclusion and Workforce Diversity Action Plan to help support the expansion of employment opportunities and attract a more diverse workforce.

15.5.27 Some of the jobseekers will be more sensitive than others. For instance, labour market outcomes indicate differences between women and men. Some women may have higher sensitivity due to experiencing a lack of decent working conditions and social security benefits, having less promotion opportunities and facing lower salaries compared to men. Some potential jobseekers, such as young adults who are unemployed and already suffering deprivation, may also have higher sensitivity.

- 15.5.28 As highlighted, there will be a predicted net increase in permanent job opportunities in the longer term which will make the magnitude of the impact **negligible**. The sensitivity of the receptor is **medium** as it will result in current job seekers attempting to secure employment with guaranteed positions, wages and job security. Combining sensitivity and impact magnitude, operational employment is a positive **negligible (not significant)** effect.

#### **Risks to operational workers' OHSW during operation**

- 15.5.29 OHSW policies are essential to protecting the health and safety of the operational staff. ALA already has HR plans and procedures in place which include elements relating to OHSW. Measures relating to OHSW are also written into their standard contract with contractors and other suppliers. The Project will require a review of ALA's environmental and social management system, for instance to confirm whether additions need to be made to the plans and procedures, or if new method statements are required. In particular this may be the case for the new equipment at the fuelling area, the new buildings and facilities such as the catering building. Monitoring of the plans and procedures will need to continue. Staff break areas have been previously flagged in the grievance log as unfit for purpose, and monitoring of staff welfare spaces is essential.
- 15.5.30 ALA has a variety of procedures and plans that address emergency preparedness and response. Operational staff need to be aware of these management tools and will be involved in drills.
- 15.5.31 The new onsite training centre will be accessible for operational workforce employees with annual training courses on the latest health and safety standards. This centre will also be used to allow the operational staff to grow and develop their technical skills. The ALA HR Policy indicates that annual performance reviews for all employees will take place which will provide them with the ability to strive for a performance bonus, and training will support skills and knowledge that contribute to career growth.
- 15.5.32 As mentioned previously, most ALA operational staff belong to a union. Participation in union organised activities and interacting with worker representatives are opportunities and means of creating a healthy, fair and respectful working environment.
- 15.5.33 In line with the World Bank Group EHS Guidelines for Airports, operational staff may be exposed to a range of occupational health and safety hazards, including physical risks (e.g. slips, trips, noise, manual handling), chemical exposures (e.g. fuels, cleaning agents), and biological hazards (e.g. waste handling, communicable diseases). These risks are addressed through ALA's existing procedures, including training, PPE use, and emergency preparedness, and will continue to be monitored and updated as part of the ongoing review of the environmental and social management system.
- 15.5.34 As mentioned in the methodology section, no significance is attributed to workers OHSW risks, but management measures are identified.

## **15.6 Mitigation**

- 15.6.1 This section describes the management measures (mitigation, enhancement and monitoring) to be taken to minimise and / or prevent the predicted potential impacts and risks related to working conditions and labour relations during both construction and operation.

#### **Construction phase mitigation**

- Outline and require a fair and transparent, gender-neutral recruitment process for all jobs.

- Prioritise employment of the local workforce ('local' to be considered Almaty City and Almaty Region) to the extent possible considering unskilled, semi-skilled and skilled workforce, and giving priority to potentially vulnerable groups, including women and young adults.
- Develop a schedule for implementing the contractor OHSW plan and procedures (including permit to commence work) based on a risk assessment prior to onsite activities which will be applicable to contractors on this Project.
- Maintain and make accessible the grievance process to all employees and workers.
- Require contractors to have OHSW plans and procedures to mitigate any health and safety risks. These plans and procedures will need to address operational staff who may be exposed to noise, dust, and emergency preparedness risks from the construction activities. Training for staff on OHSW and emergency preparedness will need to cover construction workers but also operational workers who are identified as being affected by the risks which may arise from the construction activities.
- Require contractors to provide training for unskilled local workers supported through the new onsite training centre, to allow them to obtain, retain and develop their roles as much as possible.
- Provide medical checks for construction workers prior to work on site to confirm fitness for their work and also to relieve pressure on local social infrastructure.
- For rented accommodation provided by contractors - where use is mandatory and workers cannot choose their own housing - conduct a full inspection of the facility prior to occupancy. The inspection will follow the monitoring template outlined in the EBRD and IFC Guidance on Worker Accommodation, ensuring compliance with minimum standards for safety, hygiene, privacy, and access to services.
- Require the EPC contractors to undertake a supply chain analysis of primary suppliers to identify any risks related to use of child or forced labour and unacceptable OHSW conditions. Relevant clauses will be included in the suppliers' contracts to comply with supply chain requirements in PS2 and PS6 as well as with ADP's Group Code of Conduct.
- Develop and adopt a Code of Conduct for all workers as part of their employment contract. This will cover norms relating to treating coworkers respectfully, protecting against harassment at the worksite, interacting courteously with the local community, as well as following expectations regarding the use of training and occupational behaviour.
- Increase recruitment of health and safety staff so that it is in line with the good international industry practice target of one per 50 workers.
- The contractors will be expected to have OHSW plans in place to mitigate health and safety risks. ALA has policies in place relating to child and forced labour risks; however, they only cover direct workers. These aspects need to be considered and monitored within contractors' policies.
- Require EPC contractors to provide monthly reports of their workforce (including subcontractors covering origin -local, national and international- and gender), working hours, overtime use, timely payment of wages, training activities including toolbox talks, labour grievances, protests, union activities, worker accommodation provisions, OHS statistics, and other relevant work-related details.

### **Operational phase mitigation**

- Outline and require a fair and transparent, gender-neutral recruitment process for all jobs.
- Continually monitor and update the HR Policy to promote equal opportunities for the workers.
- Continually monitor and update the OHSW Policy to mitigate operational risks for the workers.

- Require contractually that all third parties (tenants, suppliers and subcontractors) achieve compliance with the performance requirements of Kazakhstan and international requirements including EBRD ESR1, ESR2 and ESR4, IFC PS1, PS2 and PS4, and ILO 81, 148, 155 and 167.
- Require contractually that all workers have individual contracts of employment before starting on site in line with the Labour Code of Kazakhstan, EBRD ESR2 and IFC PS2 requirements. Contracts will need to cover rights and obligations of the parties, hours of work, wages, overtime, compensation and benefits such as maternity or annual leave.
- Wellbeing programmes should be considered by ALA to help support employees' development and mental health. As most flights are at night ALA could introduce awareness programmes to help the workforce manage any associated sleep deprivation issues. In addition, ALA could implement a counsellor within the onsite medical centre to help support any of the operational staff who may suffer from stress, depression and other mental health related issues.

15.6.2 If these mitigation measures are adopted, then for the workers in both the construction and operational phases of the Project, potential risks and impacts can be successfully mitigated.

## 15.7 Summary of residual effects

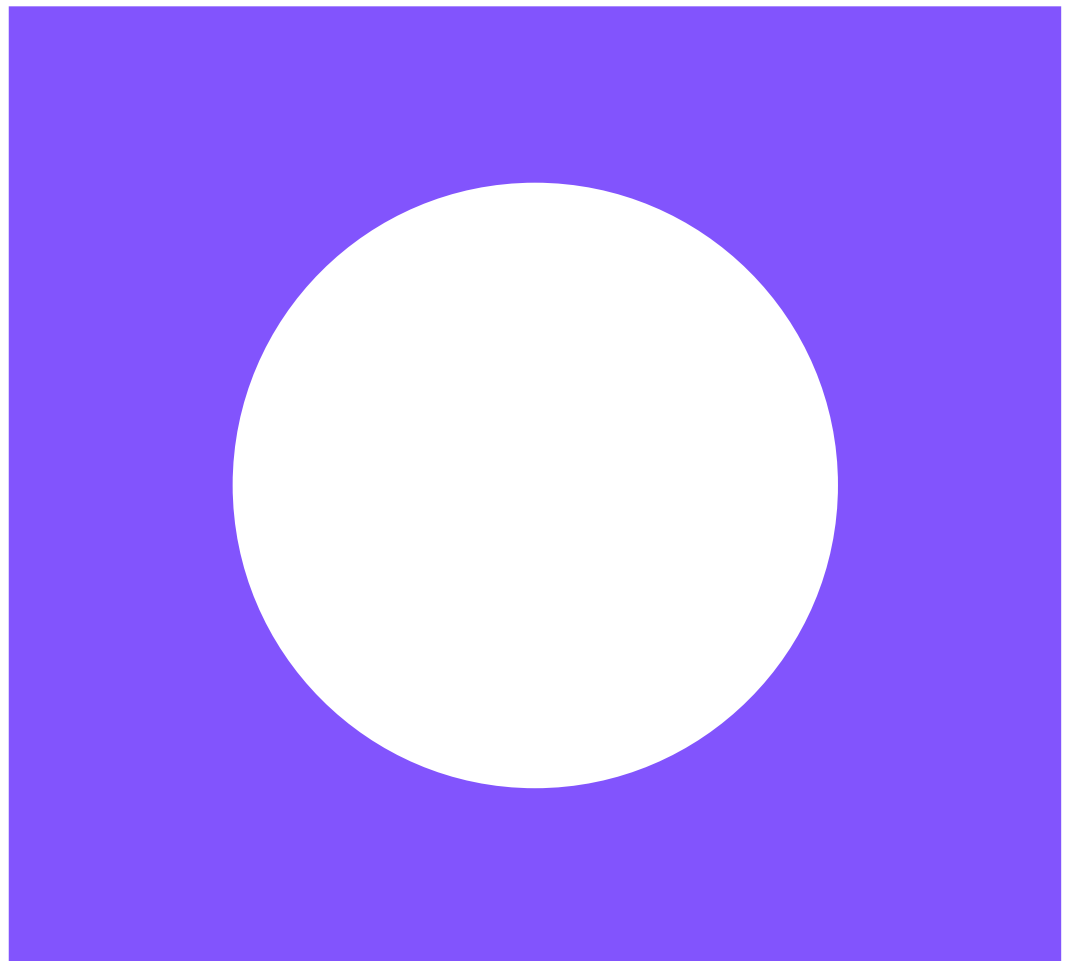
15.7.1.1 Residual effects after the application of mitigation are presented in Table 15.3.

**Table 15.3: Summary of residual effects for workers**

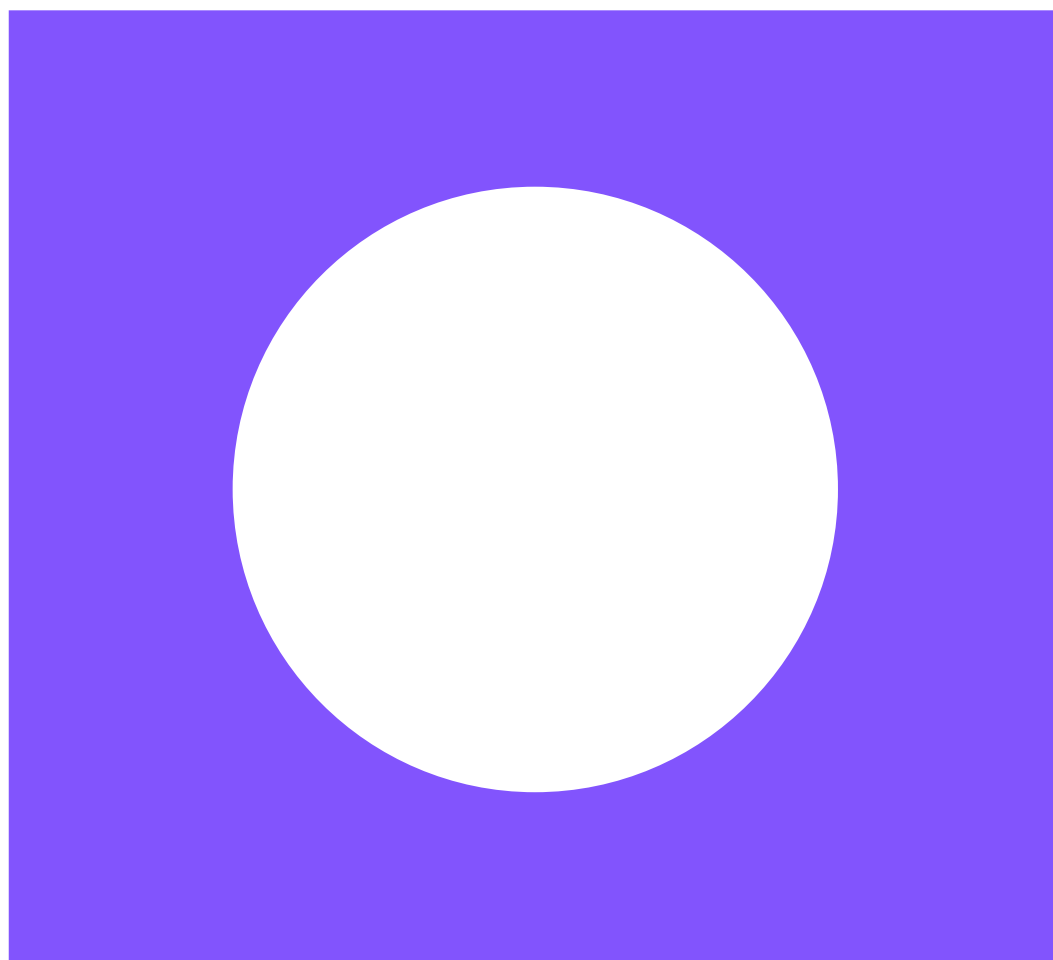
| Description of effect                                              | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Residual effect                    | Proposed monitoring          |
|--------------------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------|
| <b>Construction phase</b>                                          |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                    |                              |
| Temporary employment generation                                    | Temporary              | Medium                  | Minor               | Minor beneficial (not significant)                  | <ul style="list-style-type: none"> <li>Outline and require a fair and transparent, gender-neutral recruitment process for all jobs.</li> <li>Prioritise employment of the local workforce ('local' to be considered Almaty City and Almaty Region) to the extent possible considering unskilled, semi-skilled and skilled workforce, and giving priority to potentially vulnerable groups, including women and young adults.</li> <li>Require contractors to provide training for unskilled local workers supported through the new onsite training centre, to allow them to obtain, retain and develop their roles as much as possible. Require EPC contractors to provide monthly reports of their workforce (including subcontractors covering origin-local, national and international-and gender), working hours, overtime use, timely payment of wages, training activities including toolbox talks, labour grievances, protests, union activities, worker accommodation provisions, OHSW statistics, and other relevant work-related details.</li> </ul> | Minor beneficial (not significant) | Annually by EPC Contractors  |
| Risks to workers' wellbeing, and labour rights during construction | Temporary              | N/A                     | N/A                 | N/A                                                 | <ul style="list-style-type: none"> <li>Develop a schedule for implementing the contractor OHSW plan and procedures (including permit to commence work) based on a risk assessment prior to onsite activities which will be applicable to contractors on this Project.</li> <li>Maintain and make accessible the grievance process to all employees and workers.</li> <li>Require contractors to have OHSW plans and procedures to mitigate any health and safety risks. Staff will be provided with training on the additional risks which may arise during the construction period.</li> <li>Provide medical checks for construction workers prior to work on site to confirm fitness for their work and also to relieve pressure on local social infrastructure.</li> <li>For the rented accommodation provided by contractors (where use is obligated and individual selection is not an option), complete the</li> </ul>                                                                                                                                    | N/A                                | Quarterly by EPC Contractors |

| Description of effect                                    | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Residual effect              | Proposed monitoring                            |
|----------------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------------|
|                                                          |                        |                         |                     |                                                     | <p>inspection of the workers accommodation using the monitoring template in the accommodation EBRD and IFC Guidance on Worker Accommodation prior to use of the facility by workers.</p> <ul style="list-style-type: none"> <li>Require the EPC contractors to undertake a supply chain analysis of primary suppliers to identify any risks related to use of child or forced labour and unacceptable OHSW conditions. Relevant clauses will be included in the suppliers' contracts to comply with supply chain requirements in PS2 and PS6 as well as ADP's Group Code of Conduct.</li> <li>Adopt ADP's Group Code of Conduct for all workers as part of their employment contract. This covers norms related to treating coworkers respectfully, protecting against harassment at the worksite, interacting courteously with the local community as well as following expectations regarding use of training and occupational behaviour.</li> </ul> |                              |                                                |
| Project induced in-migration                             | Temporary              | Low                     | Minor               | Minor beneficial (not significant)                  | <ul style="list-style-type: none"> <li>Prioritise employment of the local workforce ('local' to be considered Almaty City and Almaty Region to the extent possible considering unskilled, semi-skilled and skilled workforce, and giving priority to potentially vulnerable groups, including women and young adults.</li> <li>Outline and require a fair and transparent, gender-neutral recruitment process for all jobs.</li> <li>Provide medical checks for construction workers prior to work on site to confirm fitness for their work and also to relieve pressure on local social infrastructure.</li> </ul>                                                                                                                                                                                                                                                                                                                                   | Negligible (not significant) | Annual monitoring by ALA and EPC contractor    |
| Increase in noise, dust and construction related traffic | Temporary              | N/A                     | N/A                 | N/A                                                 | <ul style="list-style-type: none"> <li>Require contractors to have OHSW plans and procedures to mitigate any health and safety risks. These plans and procedures will need to address operational staff who may be exposure to noise, dust, and emergency preparedness risks from the construction activities. Training for staff on OHSW and emergency preparedness will need to cover construction workers but also operation workers who are identified as being affected by the at risk risks which may arise from the construction activities.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                         | N/A                          | Quarterly monitoring by ALA and EPC contractor |

| Description of effect                            | Permanent or temporary | Sensitivity of receptor | Magnitude of impact | Significance of effect before additional mitigation | Additional mitigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Residual effect                   | Proposed monitoring      |
|--------------------------------------------------|------------------------|-------------------------|---------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------|
|                                                  |                        |                         |                     |                                                     | <ul style="list-style-type: none"> <li>Increase recruitment of health and safety staff so that it is in line with the good international industry practice target of one per 50 workers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                   |                          |
| <b>Operational phase</b>                         |                        |                         |                     |                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                   |                          |
| Permanent employment generation                  | Permanent              | High                    | Negligible          | Negligible (not significant)                        | <ul style="list-style-type: none"> <li>Outline and require a fair and transparent, gender-neutral recruitment process for all jobs.</li> <li>Continually monitor and update the HR Policy to promote equal opportunities for the workers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Moderate beneficial (significant) | Annual monitoring by ALA |
| Risks to workers wellbeing and health and safety | Permanent              | N/A                     | N/A                 | N/A                                                 | <ul style="list-style-type: none"> <li>Continually monitor and update the HR Policy to promote equal opportunities for the workers.</li> <li>Continually monitor and update the OHSW Policy to mitigate operational risks for the workers.</li> <li>Require contractually that all third parties (suppliers, tenants and subcontractors) achieve compliances with the performance requirements of Kazakhstan and international requirements including, EBRD ESR1, ESR2 and ESR4, IFC PS1, PS2 and PS4, and ILO 81, 148,155 and 167.</li> <li>Require contractually that all workers have individual contracts of employment before starting on site in line with the Labour Code of Kazakhstan, EBRD ESR2 and IFC PS2 requirements. Contracts will need to cover rights and obligations of the parties, hours of work, wages, overtime, compensation and benefits such as maternity or annual leave.</li> </ul> | N/A                               | Annual monitoring by ALA |







# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapters 16 and 17

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapters 16 and 17**

September 2025

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# Contents

|                                                                                                                 |    |
|-----------------------------------------------------------------------------------------------------------------|----|
| Acronyms and abbreviations                                                                                      | 1  |
| 16 Cumulative assessment                                                                                        | 2  |
| 16.1 Overview                                                                                                   | 2  |
| 16.2 Methodology                                                                                                | 2  |
| Spatial and temporal boundaries                                                                                 | 3  |
| Identification of VECs                                                                                          | 3  |
| Cumulative impact assessment                                                                                    | 4  |
| Assumptions and limitations                                                                                     | 4  |
| 16.3 Cumulative impact assessment                                                                               | 4  |
| Noise and air quality                                                                                           | 5  |
| Traffic congestion                                                                                              | 5  |
| Community wellbeing                                                                                             | 6  |
| Safety and Security Risks                                                                                       | 6  |
| Business and Economic Impacts                                                                                   | 7  |
| 16.4 Mitigation                                                                                                 | 7  |
| 17 Environmental and social management framework                                                                | 12 |
| 17.1 Overview                                                                                                   | 12 |
| 17.2 Integration with existing ESMS                                                                             | 12 |
| 17.3 Environmental and social management plans                                                                  | 12 |
| 17.4 Monitoring, evaluation, and reporting                                                                      | 12 |
| Tables                                                                                                          |    |
| Table 16.1: Sensitivity ratings of Valued Environmental and Social Components (VECs) identified for the Project | 3  |
| Table 16.2: Recommended mitigation, monitoring, and management measures by VEC and cumulative pathway           | 9  |

# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                            |
|------------------------|-------------------------------------------------------|
| BAKAD                  | Big Almaty Ring Road                                  |
| CIA                    | Cumulative Impact Assessment                          |
| TMP                    | Traffic Management Plan                               |
| E&S                    | Environment and social                                |
| EPC                    | Engineering, Procurement, and Construction            |
| ESIA                   | Environmental and Social Impact Assessment            |
| ESMF                   | Environmental and Social Management Framework         |
| C-ESMP                 | Construction Environmental and Social Management Plan |
| ESMP                   | Environmental and Social Management Plan              |
| ESMS                   | Environmental and Social Management System            |
| GRM                    | Grievance Redress Mechanism                           |
| ICAO                   | International Civil Aviation Organization             |
| IFC                    | International Finance Corporation                     |
| IWG                    | Inter-Working Group                                   |
| NIP                    | Noise Insulation Programme                            |
| NMP                    | Noise Management Plan                                 |
| PSZ                    | Public Safety Zone                                    |
| RCIA                   | Rapid Cumulative Impact Assessment                    |
| SEP                    | Stakeholder Engagement Plan                           |
| SMEs                   | Small and medium enterprises                          |
| SPZ                    | Sanitary Protection Zone                              |
| TMP                    | Traffic Management Plan                               |
| VEC                    | Valued Environmental and Social Components            |

# 16 Cumulative assessment

## 16.1 Overview

- 16.1.1 This chapter of the Environmental and Social Impact Assessment (ESIA) presents the cumulative impact assessment (CIA) for the Project. The analysis is framed within the methodological approach of the International Finance Corporation (IFC) Good Practice Handbook on Cumulative Impact Assessment and Management, recognising that not all elements of the IFC CIA methodology are fully applied.
- 16.1.2 This chapter focuses on intra-project cumulative impacts, acknowledging that the assessment of inter-project cumulative effects is constrained by limited publicly available information on reasonably foreseeable co-located developments.
- 16.1.3 Inter-project effects consider the combined influence of the Project and other reasonably foreseeable developments in the area, which include:
- The Almaty Metro Expansion (25km extension and new green line)<sup>1, 2, 3</sup>
  - The Big Almaty Ring Road (BAKAD) and national road upgrades<sup>4</sup>
  - The Almaty Railway Bypass Project<sup>5, 6</sup>
  - The 2024–2030 Housing Renovation Programme<sup>7, 8</sup>
  - Multiple industrial and manufacturing projects in the Almaty Industrial Zone (e.g. Astana Motors, ALTRA Tyres, Black Biotechnology)<sup>9</sup>
  - Industrial parks: 24 under construction<sup>10</sup>
- 16.1.4 These developments, while individually beneficial, may collectively intensify environmental and social pressures on local communities, particularly in Turksib, Guldala, Almerék, Panfilovo, and Nurshashkan.
- 16.1.5 It is worth noting that the airport has been operational since 1935 and has been operated by ALA/TAV since 2021, with an Environmental and Social Management System (ESMS) and Environmental and Social Management Plan (ESMP) in place.

## 16.2 Methodology

- 16.2.1 The assessment is based on the Rapid Cumulative Impact Assessment (RCIA) approach, outlined in the IFC Good Practice Handbook: Cumulative Impact Assessment and Management

---

<sup>1</sup> [Almaty Metro — Map, Lines, Route, Hours, Tickets](#)

<sup>2</sup> [\(17\) Extending the reach of the Almaty metro | LinkedIn](#)

<sup>3</sup> [Expanding Horizons: Future Developments of Almaty Metro in Kazakhstan](#)

<sup>4</sup> [EDB Projects – Eurasian Development Bank | Евразийский банк развития](#)

<sup>5</sup> [Kazakhstan: Almaty Railway Bypass Project](#)

<sup>6</sup> [2.-Supplementary-ESIA\\_23042025-EN.pdf](#)

<sup>7</sup> [Renovation of dilapidated housing - SEC Almaty](#)

<sup>8</sup> [Think twice, demolish once: Almaty revises its renovation program for the third time — - 11.02.2025 - Kursiv Media Kazakhstan](#)

<sup>9</sup> [Kazakhstan's major industrial projects are set to launch in 2025 — - 07.01.2025 - Kursiv Media Kazakhstan](#)

<sup>10</sup> [11 new projects will be launched in the industrial zone of Almaty in 2025 - SEC Almaty](#)

(2013)<sup>11</sup>, which emphasises the identification of Valued Environmental and Social Components (VECs) to guide the spatial, temporal, and thematic scope of the analysis.

16.2.2 The RCIA process involved the following steps:

1. Definition of the spatial and temporal boundaries relevant to the Project.
2. Identification of the VECs based on ESIA thematic chapters and stakeholder input.
3. Identification of co-located developments that may affect the same VECs.
4. Determination of each selected VEC sensitivity and justification.
5. Assessment of impacts' significance of key cumulative pathways.
6. Recommend mitigation, monitoring, and management measures.

### Spatial and temporal boundaries

16.2.3 The definition of appropriate temporal and spatial boundaries is a critical step in CIA as it frames the scope of analysis for each VEC. These boundaries are established to ensure that all relevant sources of impact - both from the Project itself and from other reasonably foreseeable developments - are considered in relation to their potential to interact over time and space.

16.2.4 Spatial boundaries have been defined based on the geographic extent of potential impacts on each VEC, taking into account the Project's area of influence, the location of sensitive receptors, and the footprint of co-located developments. Temporal boundaries reflect the anticipated duration of construction (2025–2028) and operation (from 2030 onward), while also considering legacy impacts from past activities and future trends in urban development and infrastructure expansion.

### Identification of VECs

16.2.5 VECs are defined as environmental or social components that are particularly sensitive to change or are highly valued by stakeholders. In this chapter, VECs were identified based on the findings of the ESIA's thematic chapters, with emphasis on receptors that are repeatedly exposed to multiple stressors. The selected VECs include Community, Noise, Air Quality, Road Traffic, and Business/Economy, each with an assigned sensitivity rating to guide the assessment.

16.2.6 This chapter adopts a pathway-based approach to CIA, focusing on how multiple Project-related and external factors interact to affect each VEC. Table 16.1 outlines the sensitivity levels assigned to each VEC based on their potential to be affected by Project activities during the construction and operational phases. Sensitivity ratings inform the prioritisation of mitigation and management measures.

**Table 16.1: Sensitivity ratings of Valued Environmental and Social Components (VECs) identified for the Project**

| VEC              | Sensitivity | Justification                                                                                                                                                                 |
|------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Business/Economy | Low         | Limited direct disruption expected; impacts are indirect and manageable through standard mitigation.                                                                          |
| Community        | High        | High potential for disruption due to high exposure to multiple stressors during construction and operational phases; includes safety, security, and quality of life concerns. |
| Noise            | High        | Significant potential for nuisance and health impacts, particularly from construction and aircraft operations.                                                                |

<sup>11</sup> [ifc-goodpracticehandbook-cumulativeimpactassessment.pdf](#)



| VEC          | Sensitivity | Justification                                                                                                                                                                    |
|--------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air quality  | Moderate    | Emissions from construction equipment and aircraft may affect local air quality, though impacts are expected to be localised and manageable.                                     |
| Road traffic | High        | Increased congestion and safety risks from both airport and city-wide developments, during both construction and operational phases. Affecting both community and airport users. |

- 16.2.7 Each pathway is analysed in terms of overlapping impacts from construction and operational activities, existing baseline conditions, and the vulnerability of affected populations. This approach allows for a more integrated understanding of how different impacts converge on the same receptors over time.

## Cumulative impact assessment

- 16.2.8 While the RCIA approach primarily focuses on intra-project cumulative effects - where multiple impacts from the Project interact with each other - it also accommodates a high-level assessment of inter-project cumulative effects. These include potential interactions between the Project and other reasonably foreseeable developments in the region. Due to data limitations, the inter-project assessment is qualitative in nature but follows the same pathway-based structure, allowing for integrated consideration of overlapping impacts across projects. Section 16.3 presents the results of both the intra- and inter-project assessments, organised by key cumulative pathways.

## Assumptions and limitations

- 16.2.9 The assessment of inter-project cumulative effects is high-level and qualitative, due to limited availability of detailed data on other developments in the area. However, intra-project cumulative effects, where multiple impacts from the same project affect a single VEC, are considered in more detail. This includes analysis of how noise, air quality, and traffic impacts collectively influence community wellbeing.

## 16.3 Cumulative impact assessment

- 16.3.1 The cumulative effects assessment identified the following key pathways through which impacts may interact or accumulate over time:
- Noise and air quality: Combined effects from construction machinery, aircraft operations, and increased vehicular traffic may lead to persistent nuisance and health concerns for nearby communities.
  - Traffic congestion: Cumulative traffic from construction vehicles, airport users, and workers may exacerbate existing road capacity issues, particularly during peak hours.
  - Community wellbeing: Repeated and prolonged exposure to noise, air pollution, and traffic congestion may lead to cumulative stress and reduced quality of life for local residents.
  - Safety and security risks: Overlapping risks from construction activities, increased traffic, and operational hazards (e.g., wildlife strikes, emergency events) may strain local emergency response and safety systems.
- 16.3.2 The following assessment addresses both intra-project cumulative effects and inter-project cumulative effects. Each pathway considers the combined influence of these factors on the identified VECs. While some VECs, such as business and economy, are not directly impacted by a single pathway, they are indirectly affected by the combined pressures of noise, air quality, traffic congestion, and community wellbeing. These cumulative stressors may disrupt access, reduce customer footfall, and create uncertainty for airport tenants and nearby enterprises, particularly during construction. The mitigation measures proposed aim to minimise disruption and support local economic resilience.

- 16.3.3 While not assessed as a standalone pathway, population influx may occur as a secondary effect of airport upgrades and traffic expansion, particularly if employment opportunities increase or regional connectivity improves. This could place additional pressure on housing, public services, and infrastructure in surrounding areas, especially where planning controls are limited. Although not currently considered a significant cumulative driver, population dynamics will be monitored through stakeholder engagement, and any emerging risks will be addressed through adaptive management measures.

### Noise and air quality

- 16.3.4 As detailed in **ESIA Chapter 11: Noise**, noise modelling studies indicate that communities near the airport already experience high noise levels. By 2030, over 70,000 buildings are projected to be exposed to >40 dB(A). The reconstructed second runway, increased aircraft movements, and traffic from co-located projects (e.g. industrial parks, road upgrades) will intensify this exposure. Vulnerable groups may face heightened risks of sleep disturbance, stress, and cognitive impacts (refer to **ESIA Chapter 8: Community**).
- 16.3.5 Air quality impacts will stem from construction dust, aircraft emissions, and increased road traffic. These will be compounded by emissions from industrial developments and freight transport linked to the railway bypass and BAKAD. The cumulative burden on respiratory health and wellbeing is significant, particularly in already urbanised and congested areas like Turksib and Guldala.
- 16.3.6 Air quality impacts, while more localised, are also cumulative in nature. Construction activities will generate dust and emissions, and operational phases will see increased aircraft and vehicular emissions. These pollutants, combined with existing urban air quality challenges in Almaty, may lead to respiratory issues and reduced quality of life, particularly for sensitive populations. The overlapping exposure to both noise and air pollution creates a compounded health burden.
- 16.3.7 While mitigation measures such as the Noise Insulation Programme (NIP), which forms part of the broader Noise Management Plan (NMP), along with buffer zones and air quality monitoring, are either in place or planned, the cumulative nature of these impacts necessitates ongoing, adaptive management. Transparent communication with affected communities will be essential, particularly as the NMP is expected to be updated as part of this Project.
- 16.3.8 The cumulative impact on community health and wellbeing from noise and air quality is considered to be of **moderate adverse significance**, particularly for vulnerable groups in Guldala and Turksib, where exposure is expected to intensify under future operational scenarios.

### Traffic congestion

- 16.3.9 Traffic congestion is a critical cumulative pathway, with both construction and operational phases contributing to increased pressure on local road networks. During construction, heavy vehicle movements, worker transport, and material deliveries will intensify congestion, particularly along Mailin Road and through residential streets in Almerék and Guldala. GPS navigation applications often re-route drivers through these neighbourhoods, exacerbating peak-hour congestion and increasing the risk of accidents. The opening of the BAKAD has helped alleviate some pressure, but without dedicated access routes to the airport, residential areas remain vulnerable to through-traffic.
- 16.3.10 In the operational phase, increased passenger and cargo volumes will drive further growth in private vehicle use, taxis, and service vehicles. The absence of a functioning metro connection to the airport for at least another decade means that road-based transport will remain dominant. This will likely lead to chronic congestion, increased emissions, and reduced accessibility for

local residents. The cumulative impact is particularly relevant in Nurshashkan and Guldala, where traffic-related grievances have already been recorded. While the Transport Master Plan to 2030 includes multimodal corridors and public transport upgrades, the cumulative burden of traffic on community wellbeing and infrastructure resilience remains a significant concern.

- 16.3.11 The cumulative impact of traffic congestion is considered to be of **moderate adverse significance**. Without improved public transport and access planning, future conditions may lead to chronic congestion and reduced mobility for residents in Nurshashkan and Guldala.

### Community wellbeing

- 16.3.12 The cumulative stressors affecting community wellbeing stem from a combination of environmental nuisances, legal uncertainty (e.g. the establishment of Sanitary Protection Zones (SPZs)), and socio-economic pressures. Residents in Almerek, Guldala, and Turksib are already exposed to high levels of noise, air pollution, and traffic congestion. These stressors, when experienced simultaneously and over extended periods, contribute to chronic stress, sleep disruption, and reduced mental health. Survey data from 2025 indicates that 30% of households report health impacts linked to airport noise, with women and children disproportionately affected (see **ESIA Chapter 8: Community**). Vulnerable groups such as pregnant women, the elderly, and large families are particularly at risk, and the presence of illegal housing adds another layer of insecurity and exclusion from public services.
- 16.3.13 The uncertainty surrounding the establishment of SPZs further compounds community anxiety. Many residents fear displacement or the inability to legalise their homes, which limits access to healthcare, education, and social assistance. While the airport has engaged in stakeholder consultations and implemented mitigation measures like the NIP, the cumulative effect of environmental, legal, and social stressors undermines trust and resilience. Addressing community wellbeing requires a holistic approach that integrates environmental management, legal clarity, and inclusive development planning.
- 16.3.14 The cumulative impact on community wellbeing is considered to be of **moderate adverse significance**, especially for vulnerable populations facing overlapping environmental, legal, and socio-economic stressors. Without coordinated planning and inclusive engagement, future conditions may further erode resilience and trust.

### Safety and Security Risks

- 16.3.15 Safety and security risks during both construction and operational phases are cumulative in nature, particularly when considering the proximity of residential areas to the airport and the scale of ongoing development. During construction, risks include accidental exposure to hazardous materials, traffic incidents, and potential breaches of restricted zones. While these risks are mitigated through Construction ESMPs and emergency response plans, the cumulative exposure to construction-related hazards, especially in areas like Guldala and Panfilovo, can erode community perceptions of safety and increase stress levels.
- 16.3.16 In the operational phase, risks shift toward aircraft-related incidents, fuel storage hazards, and broader security concerns such as smuggling or illicit activity. The expansion of the fuel farm and increased air traffic elevate the potential consequences of rare but high-impact events. The presence of unregulated housing within high-risk zones further complicate emergency preparedness and response.
- 16.3.17 This concern is underscored by the Bek Air Flight 2100 crash on 27 December 2019, when a Fokker 100 aircraft lost lift during take-off from Almaty International Airport and collided with a residential building located just 9-10 metres beyond the airport perimeter fence, resulting in 12

fatalities and 47 injuries<sup>12</sup>. Although the airport has robust safety systems aligned with International Civil Aviation Organization (ICAO) standards and conducts regular drills, the cumulative nature of these risks, combined with community vulnerability and limited legal protections, necessitates enhanced coordination between airport authorities, local governments, and residents to ensure long-term safety and resilience. In light of these risks, the NMP will be subject to periodic review, with updates aligned to changes in land use planning, safety incidents, and stakeholder feedback as stated in **ESIA Chapter 11: Noise**.

- 16.3.18 Cumulative safety and security risks may emerge in areas near the airport perimeter, particularly where unregulated housing and limited planning controls persist. While current risks are manageable, future conditions could increase vulnerability if not addressed through proactive coordination and integrated planning measures.

## Business and Economic Impacts

- 16.3.19 Cumulative impacts on local businesses and the regional economy may arise during both the construction and operational phases. During construction, access disruptions, noise, and dust may affect airport tenants and small enterprises in surrounding areas, particularly those reliant on foot traffic or logistics. Informal businesses operating near the airport may also face challenges due to regulatory changes and land use planning (e.g. SPZ/Public Safety Zone (PSZ) designations).
- 16.3.20 In the operational phase, increased passenger and cargo volumes are expected to stimulate economic activity and create opportunities for growth. However, this may also strain infrastructure and services, especially if connectivity and access are not improved. Without clear communication and support, small and medium enterprises (SMEs) may struggle to adapt to changing conditions. Supporting local procurement, maintaining access, and ensuring inclusive stakeholder engagement will be key to minimising disruption and enhancing long-term economic benefits.
- 16.3.21 The cumulative impact on business and the local economy is considered to be of both **moderate adverse and moderate beneficial significance**, with the potential for positive outcomes if access and engagement are well managed. However, without proactive coordination and support, particularly for informal and small enterprises, future conditions may result in disruption and missed opportunities for inclusive economic growth.

## 16.4 Mitigation

- 16.4.1 This section outlines recommended measures to address the cumulative impacts identified across the VECs and key pathways. The measures are structured to support effective mitigation of adverse effects, enable ongoing monitoring of environmental and social conditions, and ensure adaptive management throughout the construction and operational phases of the project. Each set of recommendations is tailored to the sensitivity of the VEC and the nature of the cumulative pathway, considering both intra-project and inter-project interactions.
- 16.4.2 The mitigation measures presented in this section have been iteratively reviewed and aligned with those identified in the topic-specific impact assessments conducted as part of the broader ESIA process. No new topic-specific measures have been introduced through the cumulative impact assessment. Instead, the cumulative analysis has served to reinforce and ensure consistency across the ESIA chapters.

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<sup>12</sup> Accident Fokker 100 UP-F1007, Friday 27 December 2019

- 16.4.3 Table 16.2 presents targeted strategies to address cumulative impacts on each VEC, organised by key pathways. Measures are designed to support impact avoidance, reduction, and adaptive response over time.
- 16.4.4 The mitigation, monitoring, and management measures listed in Table 16.2 reflect a combination of actions that are either directly within the authority of ALA or recommended for coordination with external stakeholders, such as local government, aviation authorities, and infrastructure developers. Measures under ALA's operational control, such as updates to emergency response plans, stakeholder engagement, and internal safety protocols, are considered binding and will be implemented as part of the Project's ESMS.
- 16.4.5 Additional measures identified through the CIA relate exclusively to broader, cross-cutting issues that require coordination with third parties. These recommended actions are presented **in bold** in Table 16.2 to distinguish them from binding measures already embedded in the topic chapters. ALA will seek to support these actions through engagement and collaboration with relevant stakeholders. The "Responsibility" column in Table 16.2 indicates whether ALA is directly responsible for implementation or whether coordination with external parties is required.

**Table 16.2: Recommended mitigation, monitoring, and management measures by VEC and cumulative pathway**

| VEC       | Key pathway                                    | Responsibility     | Mitigation, monitoring and management measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------|------------------------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Community | Community wellbeing, safety and security risks | ALA implementation | <ul style="list-style-type: none"> <li>Mitigation measures: <ul style="list-style-type: none"> <li>Implement and regularly update the Stakeholder Engagement Plan (SEP), ensuring inclusive communication with vulnerable groups.</li> <li>Strengthen the Grievance Redress Mechanism (GRM) to handle cumulative concerns (e.g. noise, traffic, safety) with clear escalation protocols.</li> <li>Ensure community safety protocols are integrated into both construction and operational Emergency Response Plans.</li> <li><b>Continue engagement with local authorities through the IWG to monitor developments related to housing legalisation in areas affected by SPZ/PSZ discussions. While ALA is not responsible for legalisation decisions, ongoing coordination will support informed planning and stakeholder engagement.</b></li> <li><b>Collaborate with aviation authorities to assess and communicate risks related to flight safety and proximity of residential buildings to the airport perimeter.</b></li> </ul> </li> <li>Monitoring measures: <ul style="list-style-type: none"> <li>Track community grievances by type, location, and resolution time.</li> <li>Conduct annual community wellbeing surveys to assess perceived quality of life and stressors.</li> <li>Monitor demographic shifts and housing trends in high-impact zones.</li> <li>Monitor implementation of flight safety recommendations.</li> </ul> </li> <li>Management measures: <ul style="list-style-type: none"> <li>Establish a Community Liaison Committee to coordinate between airport, contractors, and local authorities.</li> <li>Integrate community risk considerations into airport-wide safety drills and emergency simulations.</li> <li><b>Ensure coordination between airport authorities, emergency services, and municipal planners to address cumulative safety risks.</b></li> </ul> </li> </ul> |
|           |                                                | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                                | ALA coordination   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                                | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                                | ALA Coordination   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                                | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                                | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                                | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                                | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                                | ALA coordination   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                                | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|           |                                                | ALA coordination   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Noise     | Noise and air quality                          | ALA implementation | <ul style="list-style-type: none"> <li>Mitigation measures: <ul style="list-style-type: none"> <li>Expand the NIP to include additional households and public facilities (e.g. kindergartens) within high-exposure zones.</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| VEC          | Key pathway           | Responsibility     | Mitigation, monitoring and management measures                                                                                                                                                                                                                                                                                        |
|--------------|-----------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air quality  | Noise and air quality | ALA implementation | <ul style="list-style-type: none"> <li>– Continue implementing the use of interchangeable approach and departure directions (runways 05 and 23) during night-time hours to reduce sleep disturbance.</li> </ul>                                                                                                                       |
|              |                       | ALA implementation | <ul style="list-style-type: none"> <li>– Require contractors to use low-noise equipment and limit high-noise activities to daytime hours.</li> </ul>                                                                                                                                                                                  |
|              |                       | ALA implementation | <ul style="list-style-type: none"> <li>• Monitoring measures: <ul style="list-style-type: none"> <li>– Continuous noise monitoring at fixed stations in Almerék, Guldala, and Turksib.</li> </ul> </li> </ul>                                                                                                                         |
|              |                       | ALA implementation | <ul style="list-style-type: none"> <li>– Annual review of noise contour maps to reflect changes in operations and aircraft types.</li> </ul>                                                                                                                                                                                          |
|              |                       | ALA coordination   | <ul style="list-style-type: none"> <li>• Management measures: <ul style="list-style-type: none"> <li>– <b>Coordinate with city planners to avoid siting new sensitive receptors in high-noise zones.</b></li> </ul> </li> </ul>                                                                                                       |
|              |                       | ALA implementation | <ul style="list-style-type: none"> <li>• Mitigation measures: <ul style="list-style-type: none"> <li>– Promote clean fuel or electric vehicles for airport ground operations and logistics partners.</li> <li>– Require all contractors to implement dust suppression measures and use low-emission machinery.</li> </ul> </li> </ul> |
|              |                       | ALA coordination   | <ul style="list-style-type: none"> <li>– <b>Coordinate with city authorities to manage emissions from industrial zones and freight corridors.</b></li> </ul>                                                                                                                                                                          |
|              |                       | ALA implementation | <ul style="list-style-type: none"> <li>• Monitoring measures: <ul style="list-style-type: none"> <li>– Continue conducting air quality monitoring.</li> </ul> </li> </ul>                                                                                                                                                             |
|              |                       | ALA implementation | <ul style="list-style-type: none"> <li>– Track PM2.5, NOx, and VOC levels during both construction and operation.</li> </ul>                                                                                                                                                                                                          |
|              |                       | ALA implementation | <ul style="list-style-type: none"> <li>• Management measures: <ul style="list-style-type: none"> <li>– Integrate air quality data into the Environmental and Social Management System (ESMS) for adaptive response.</li> </ul> </li> </ul>                                                                                            |
| Road traffic | Traffic congestion    | ALA implementation | <ul style="list-style-type: none"> <li>• Mitigation measures: <ul style="list-style-type: none"> <li>– Develop a construction Traffic Management Plan (TMP) to avoid peak hours and residential routes.</li> </ul> </li> </ul>                                                                                                        |
|              |                       | ALA implementation | <ul style="list-style-type: none"> <li>– Promote carpooling, shuttle services, and public transport for workers and airport staff.</li> </ul>                                                                                                                                                                                         |
|              |                       | ALA coordination   | <ul style="list-style-type: none"> <li>– <b>Coordinate with city authorities to fast-track the metro extension and improve last-mile connectivity.</b></li> </ul>                                                                                                                                                                     |
|              |                       |                    | <ul style="list-style-type: none"> <li>• Monitoring measures</li> </ul>                                                                                                                                                                                                                                                               |

| VEC              | Key pathway                      | Responsibility     | Mitigation, monitoring and management measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------|----------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                                  | ALA implementation | <ul style="list-style-type: none"> <li>– Monitor traffic volumes and travel times on key access roads (e.g. Mailin Road, BAKAD connectors).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                  |                                  | ALA implementation | <ul style="list-style-type: none"> <li>– Track accident rates and near-miss incidents in high-traffic zones.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                  |                                  | ALA coordination   | <ul style="list-style-type: none"> <li>• Management measures: <ul style="list-style-type: none"> <li>– <b>Establish a joint traffic coordination task force with city transport planners and developers of co-located projects.</b></li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                  |                                  | ALA implementation | <ul style="list-style-type: none"> <li>– Develop and indicative an indicative Surface Access Strategy to reflect cumulative traffic forecasts and modal shifts.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Business/Economy | Indirectly affected by all above |                    | <ul style="list-style-type: none"> <li>• Mitigation measures: <ul style="list-style-type: none"> <li>– Minimise disruption to airport-based and nearby businesses by maintaining access and clear communication during construction.</li> <li>– Encourage local procurement and employment where feasible to support the regional economy.</li> </ul> </li> <li>• Monitoring measures: <ul style="list-style-type: none"> <li>– Track local procurement volumes and employment figures linked to the project.</li> </ul> </li> <li>• Management measures: <ul style="list-style-type: none"> <li>– Include business-related considerations in stakeholder engagement activities, particularly for airport tenants and SMEs in the immediate vicinity.</li> </ul> </li> </ul> |
|                  |                                  | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                  |                                  | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                  |                                  | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                  |                                  | ALA implementation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



# 17 Environmental and social management framework

## 17.1 Overview

- 17.1.1 This chapter outlines the overarching framework through which the Project will manage environmental and social (E&S) risks and impacts throughout its lifecycle. It serves as a bridge between the impact assessment and the implementation of mitigation and monitoring measures and builds on the existing Environmental and Social Management System (ESMS) and organisational capacity to manage E&S performance.

## 17.2 Integration with existing ESMS

- 17.2.1 Almaty International Airport (ALA) has an established ESMS that provides the foundation for E&S risk management. This system includes policies, procedures, and tools aligned with international good practice. The airport is also certified under ISO 14001, demonstrating its commitment to systematic environmental management and continual improvement. The ESMS will be updated to incorporate project-specific risks and mitigation measures identified through the ESIA, ensuring alignment with the evolving scope and scale of the Project.
- 17.2.2 ALA will continue to maintain a dedicated E&S team responsible for:
- Overseeing implementation of the ESMP and associated management plans
  - Coordinating with contractors, consultants, and third parties
  - Supervising the implementation of Engineering, Procurement, and Construction (EPC) contractors' Construction Environmental and Social Management Plans (C-ESMPs)
  - Ensuring compliance with E&S commitments and regulatory requirements
  - Building capacity through training, supervision and continuous improvement initiatives

## 17.3 Environmental and social management plans

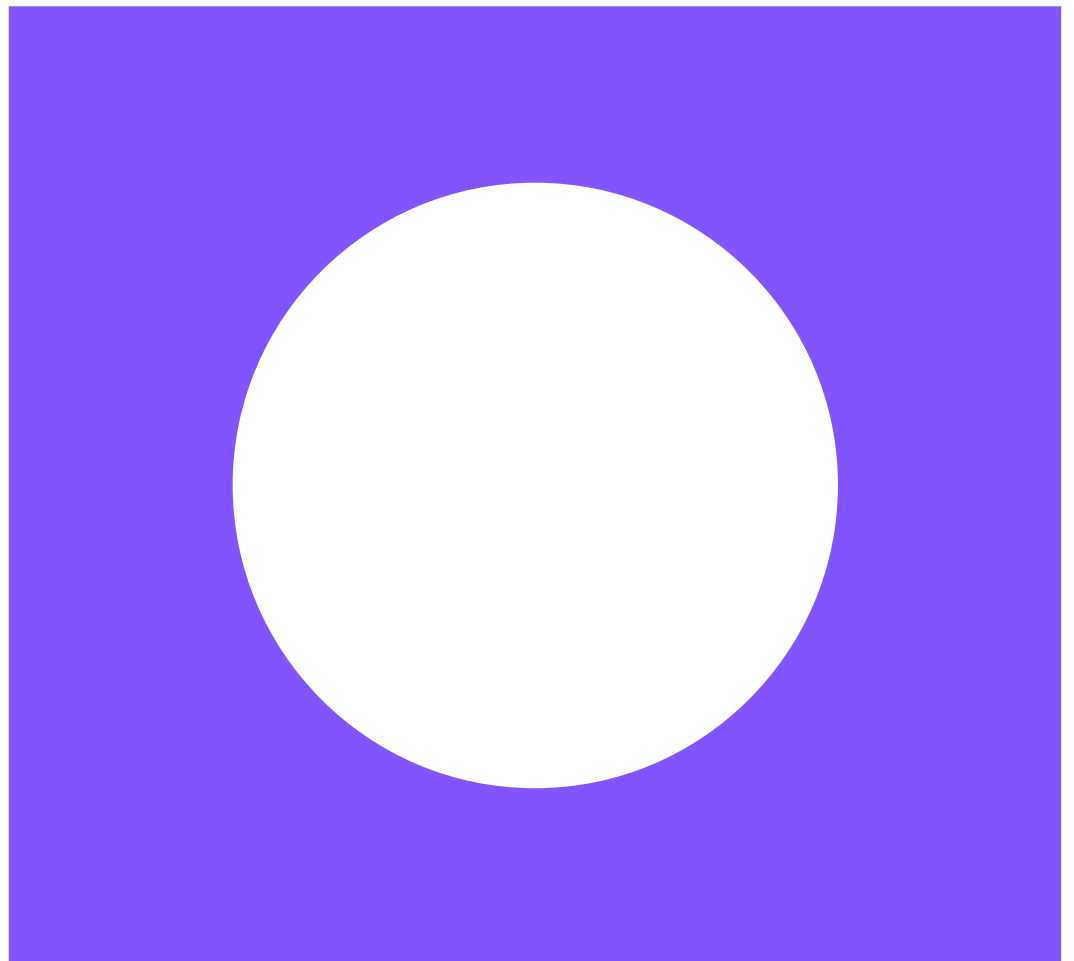
- 17.3.1 A high-level framework ESMP will be developed for this Project Horizon. The ESMP will outline the suite of management plans required during the construction and operation phases. These management plans will be developed by ALA and the EPC Contractors and will detail specific mitigation, enhancement and monitoring measures, responsibilities, and implementation timelines.
- 17.3.2 The ESMP will include, among others, the following topic plans: Noise Management Plan, Traffic Management Plan, Air Quality Management Plan, Waste Management Plan, Community Health and Safety Plan, Stakeholder Engagement Plan, and Emergency Preparedness and Response Plan. This list is not exhaustive. The ESMP will be embedded within the overarching Environmental and Social Management Framework (ESMF), which provides the structure for environmental and social risk management across the lifecycle of Project Horizon.

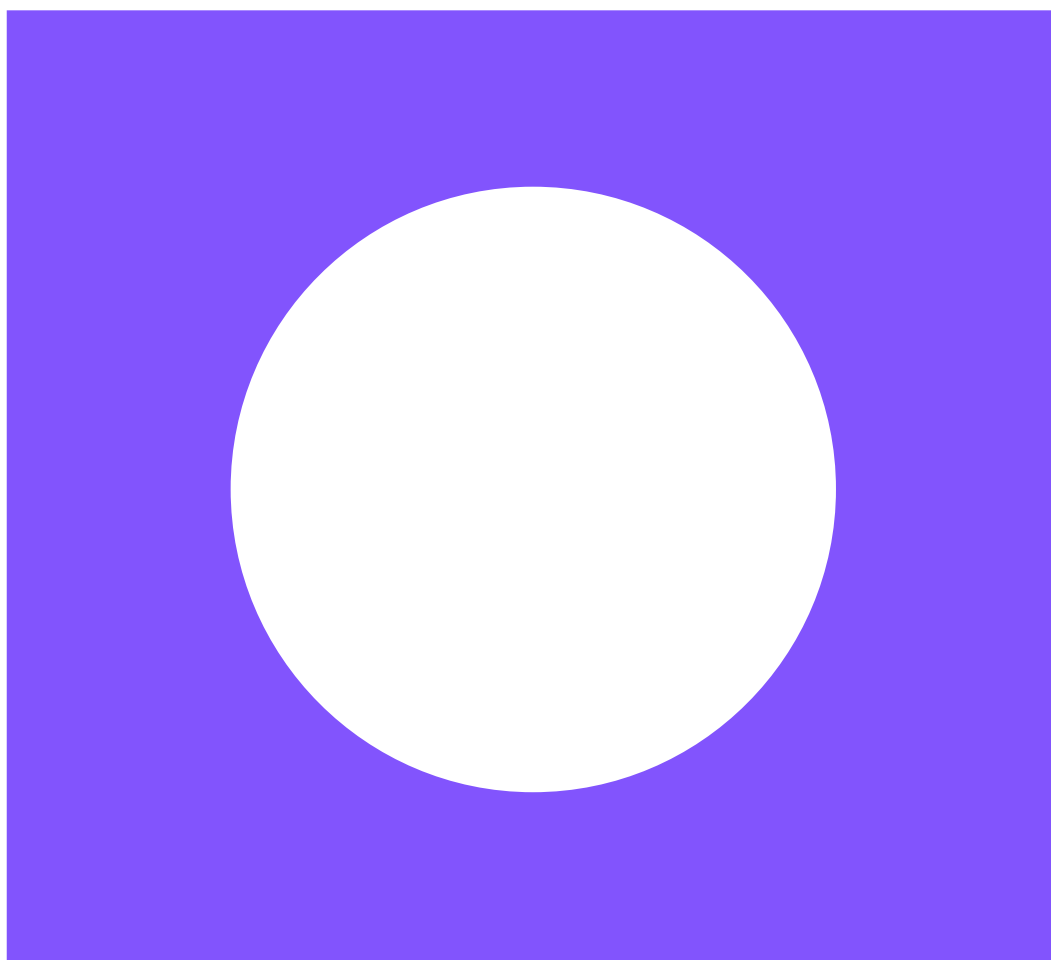
## 17.4 Monitoring, evaluation, and reporting

- 17.4.1 Monitoring and reporting are essential for tracking the effectiveness of mitigation measures and ensuring compliance with E&S requirements.
- 17.4.2 Performance monitoring, reporting and auditing will be carried out to ensure compliance with the requirements of the ESIA and ESMP. This will be defined in the ESMP and will include:

- Monitoring during the construction phase of key environmental and social parameters
- Monitoring during the operational phase to ensure long-term compliance and performance
- Independent auditing commissioned on behalf of the prospective Lenders to verify implementation and effectiveness
- Monitoring results will be shared with stakeholders through periodic disclosure mechanisms to promote transparency and accountability

17.4.3 This framework ensures that the Project is implemented in a manner that is consistent with the airport's ongoing E&S commitments and supports continuous improvement in environmental and social performance.





# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 18

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 18**

September 2025

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|          |            |            |         |          |                                            |
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# Contents

|                                                                            |    |
|----------------------------------------------------------------------------|----|
| Acronyms and abbreviations                                                 | 1  |
| 18 Information disclosure and consultation                                 | 2  |
| 18.1 Overview                                                              | 2  |
| 18.2 Stakeholder consultation objectives                                   | 2  |
| 18.3 Stakeholder identification and analysis                               | 2  |
| 18.4 Previous stakeholder engagement                                       | 3  |
| 18.5 ESIA stakeholder engagement activities                                | 3  |
| Draft ESIA Report disclosure                                               | 3  |
| Public consultation meeting                                                | 3  |
| Disclosure of the final ESIA Report                                        | 4  |
| International disclosure                                                   | 4  |
| 18.6 Stakeholder Engagement planned throughout the lifetime of the Project | 4  |
| 18.7 Grievance processes                                                   | 4  |
| Grievance mechanism                                                        | 4  |
| Confidentiality and anonymity                                              | 5  |
| Grievance reporting and resolution                                         | 5  |
| 18.8 Community Liaison Officer                                             | 5  |
| Appendix 18.A: Public consultation announcements                           | 7  |
| Appendix 18.B: Public consultation Q&A                                     | 8  |
| Appendix 18.C: Public consultation photos                                  | 10 |
| Appendix 18.D: Public consultation materials                               | 11 |
| Tables                                                                     |    |
| Table 18.1: CLO contact details                                            | 5  |



# Acronyms and abbreviations

| Abbreviation / Acronym | Definition                                       |
|------------------------|--------------------------------------------------|
| ALA                    | Almaty International Airport                     |
| CLO                    | Community Liaison Officer                        |
| EBRD                   | European Bank for Reconstruction and Development |
| EPC                    | Engineering, procurement and construction        |
| ESIA                   | Environmental and Social Impact Assessment       |
| ESR5                   | Environment and Social Requirement 5             |
| IFC                    | International Finance Corporation                |
| LARF                   | Land Acquisition and Resettlement Framework      |
| NIP                    | Noise Insulation Programme                       |
| NTS                    | Non-Technical Summary                            |
| PS5                    | Performance Standard 5                           |
| PSZ                    | Public Safety Zone                               |
| Q&A                    | Questions and Answers                            |
| SEP                    | Stakeholder Engagement Plan                      |
| SPZ                    | Sanitary Protection Zone                         |

# 18 Information disclosure and consultation

## 18.1 Overview

- 18.1.1 This chapter summarises the information disclosure, consultation and participation activities that are planned in accordance with Almaty International Airport's (ALA) Stakeholder Engagement Plan (SEP). It also summarises the outcomes of those activities that have been undertaken to date, and defines those actions planned for future phases in the Project lifecycle. The SEP was shared on the ALA website (<https://www.alaport.com>) as part of the new international terminal project and the updated SEP will be shared on the ALA website for this Project.
- 18.1.2 The Almaty International Airport SEP was first developed in 2021, within the context of the new international terminal construction. It aimed to guide stakeholder engagement and public consultation activities throughout all phases of that development's lifecycle, including the Environmental and Social Impact Assessment (ESIA) process. The SEP was subject to various updates until May 2025, and it has now been updated to consider this Project.
- 18.1.3 The SEP is a strategic document used to plan a comprehensive and culturally appropriate approach to consultation and disclosure. It is underpinned by the principles that community engagement should be free of external manipulation, interference, coercion and intimidation, and conducted on the basis of timely, relevant, understandable and accessible information. Consultation is to be well planned and based on respectful and meaningful dialogue. All consultation activities will be planned to facilitate the active participation in stakeholder engagement of all vulnerable groups identified in this ESIA study, including women, elderly and disabled members.
- 18.1.4 The SEP will remain a live document throughout the life of the Project. It will be regularly reviewed and updated, including at the completion of the ESIA process and during the construction and operational phases, as soon as stakeholders' needs have evolved.

## 18.2 Stakeholder consultation objectives

- 18.2.1 Public consultation and disclosure are a cornerstone of the approach to the planning and implementation of large infrastructure projects such as this one. Effective dialogue and exchange amongst the full range of stakeholders is a critical element to the success of the ESIA and Project planning processes, and the subsequent realisation of Project objectives. Stakeholder engagement will be used as a tool for two-way communication between ALA (including its managers/team, consultants and contractors) and the public. ALA is committed to active and ongoing communication with all affected communities, organisations, groups and individuals with an interest in the Project.

## 18.3 Stakeholder identification and analysis

- 18.3.1 In accordance with the European Bank for Reconstruction and Development (EBRD) and the International Finance Corporation (IFC) requirements regarding stakeholder engagement, ALA previously and in an ongoing manner identifies various individuals and groups who are affected or likely to be affected (directly or indirectly) by the Project (affected parties) or having an interest in the Project (other interested parties). The identified stakeholder groups are presented in Table 2 of the SEP.

## 18.4 Previous stakeholder engagement

- 18.4.1 Over the last five years, ALA has developed a close working relationship with the relevant ministries, regional, municipal and local authorities focused on the previous construction activities which were completed in 2024.
- 18.4.2 Information on the stakeholder engagement carried out during the preparation phase and construction phase for the new international terminal is outlined in Section 4 of the SEP. Information about engagement relating to the Noise Insulation Programme (NIP) and Public Safety Zone (PSZ) and Sanitary Protection Zone (SPZ) is also included in Section 4 of the SEP.
- 18.4.3 Land acquisition and resettlement are not triggered under Project Horizon. A Land Acquisition and Resettlement Framework (LARF) was prepared under the Original Deal, referring to current ALA operations, and remains applicable to Project Horizon. Should any land acquisition be required in future, it will be addressed in accordance with the provisions of the LARF and aligned with IFC Performance Standard 5 (PS5) and EBRD Environment and Social Requirement 5 (ESR5). The LARF will be re-disclosed as part of the ESIA documentation package.

## 18.5 ESIA stakeholder engagement activities

- 18.5.1 The following sections outline the ESIA disclosure and consultation process.

### Draft ESIA Report disclosure

- 18.5.2 Upon completion of the draft ESIA, the disclosure process will commence in line with the plan outlined in this chapter and in line with the requirements of EBRD and IFC. The disclosure process will be led by ALA with the aim of seeking stakeholder and public comments on the ESIA and its findings. This includes making available copies of the ESIA and the Non-Technical Summary (NTS), providing a means of supplying comments that are to be considered, and a public information event where attendees are given the opportunity to hear about the ESIA, ask questions to airport representatives and environmental and social experts, and provide comments.

### Public consultation meeting

- 18.5.3 A public consultation meeting was convened on 7 September 2025 at the House of Culture, 42 Mailin Street, Almaty, for the purpose of presenting the ESIA findings for Project Horizon. The event was organised by ALA and attended by representatives from ALA, EcoSocio Analysts, and approximately 60 members of the local community, 16 of whom were women. The meeting started at 11:30 and lasted for one hour. Refer to Appendix 18.A: Public consultation announcements for copies of the announcements regarding the public consultation meeting.
- 18.5.4 The session commenced with participant registration, followed by an opening speech delivered by the facilitator which included a health and safety briefing and formal introductions of the panel. The panel included the project team, ESIA consultants, and local authorities. The agenda and procedures for reviewing project-related documentation were outlined, and all information was delivered in both Kazakh and Russian to ensure accessibility. The presentation covered the objectives of the ESIA, an overview of the Project components, the assessment methodology, key findings, and proposed mitigation measures. Following the presentation, a short break was held during which questions were registered. Refer to Appendix 18.C: Public consultation photos and Appendix 18.D: Public consultation materials.
- 18.5.5 The subsequent Questions and Answers (Q&A) session was facilitated with panellists responding directly to the audience. Participants were encouraged to keep comments concise and respectful, and alternative methods for submitting questions were provided, including a QR

code for written submissions. In cases where immediate responses were not possible, contact details were collected for follow-up. During the consultation, community members raised a number of concerns (refer to Appendix 18.B: Public consultation Q&A), including:

- Community disturbance due to the asphalt plant near Almerék
- Planned acquisition of garages along Akhmetova Street for public use
- NIP related questions on which houses are covered by the programme
- NIP related questions on how soundproofing works
- Property legalisation issues
- Intermittent internet connectivity due to flights paths

18.5.6 Eight new volunteers registered for the NIP and received detailed information on the process. No comments were received regarding future impacts related with Project Horizon developments. As such, no new mitigation measures are required to date. The ESIA has already identified the relevant impacts, which adequately cover the topics raised, and has proposed appropriate mitigation actions.

18.5.7 The event concluded with an invitation to refreshments, reinforcing the inclusive and participatory nature of the consultation.

### **Disclosure of the final ESIA Report**

18.5.8 This ESIA Report will be finalised after the 60 days of disclosure and consultation period by incorporating stakeholder comments and queries in the ESIA Report as necessary.

18.5.9 The final ESIA Report and documentation will be disclosed via the ALA website (<https://www.alaport.com>) and will be provided in hard copies upon request.

### **International disclosure**

18.5.10 International disclosure of the draft ESIA package needs to be undertaken via the EBRD ([www.ebrd.com](http://www.ebrd.com)) and IFC ([www.ifc.org](http://www.ifc.org)) websites for a period of 60 days starting from the date of ESIA publication, in accordance with the EBRD Environmental and Social Policy and IFC Environmental and Social Sustainability Policy. The final ESIA package will be disclosed on the Lenders' websites via the same links used to disclose the draft ESIA package. Hard copies of the full ESIA documentation will be made available locally at Akhmetova 1b, Hotel Aksunkar, 2nd floor, office 245.

## **18.6 Stakeholder Engagement planned throughout the lifetime of the Project**

18.6.1 The SEP outlines ongoing stakeholder engagement throughout the Project's lifecycle including construction, operation and decommissioning phases. The activities include communications as necessary with community representatives and other key stakeholders at key milestones of the Project such as the beginning and end of construction, regular updating of the ALA website and disclosure via social media/mass media outlets, updating the SEP and annual Project reporting.

## **18.7 Grievance processes**

### **Grievance mechanism**

18.7.1 The Project identifies grievance as an actual or perceived problem that might give grounds for complaint. As a general policy, ALA/the Project Sponsor will work proactively towards

preventing grievances through the implementation of impact mitigation measures (as identified by the ESIA Report and Environmental and Social Management Plan) and ongoing engagement by the Community Liaison Officer (CLO). Anyone will be able to submit a grievance to the Project if they believe a practice is having a detrimental impact on him or her individually, on the community, the environment, or on their quality of life. They may also submit comments and suggestions as set out in the SEP.

## Confidentiality and anonymity

- 18.7.2 The Project will aim to protect the person's confidentiality when requested and will guarantee anonymity of persons filing complaints in annual reporting. Anonymous grievances will be accepted. Individuals will be asked permission whether they are comfortable with disclosing their identity if this helps the resolution of a particular grievance, and their identity will be disclosed only if consent has been provided by the individual who submitted the grievance. Investigations will be undertaken in a manner that is respectful of the aggrieved party and the principle of confidentiality. The aggrieved party will need to recognise that there may be situations when disclosure of identity is required, and the Project will identify these situations to find out whether the aggrieved party wishes to continue with the investigation and resolution activities.

## Grievance reporting and resolution

- 18.7.3 A grievance mechanism, which is already in place as detailed in the SEP, provides a formalised tool for receiving, acknowledging, investigating and addressing grievances, complaints and concerns from the Project-affected communities and individuals as well as interested stakeholders. This aims to offer predictable, transparent and credible processes for all the parties, producing relatively inexpensive, fair and effective results. It also aims to provide a gender-sensitive, inclusive and culturally acceptable process that will be available to all members of the community. Effective stakeholder engagement aims to build trust and to maintain constructive relationships with the host communities and interested stakeholders, encourage a positive perception of the Project, and contribute to its successful development and implementation

## 18.8 Community Liaison Officer

- 18.8.1 ALA has appointed a CLO and an assistant. The two staff will be responsible for community liaison and arranging communications with the Project-affected communities throughout the preparation, construction and operational phases.
- 18.8.2 The CLO team will document and record stakeholder engagement as detailed within the SEP and will evaluate stakeholder engagement performance to inform respective SEP updates. The CLO team will be responsible for leading the implementation of the SEP and receiving and channelling comments and concerns. The CLO team will maintain the grievance mechanism and report to the ALA/Project Sponsor management.
- 18.8.3 Contact details of the CLO appointed by ALA are provided in Table 18.1.

**Table 18.1: CLO contact details**

| Project CLO | Information                                                         |
|-------------|---------------------------------------------------------------------|
| Name        | Mariya Pozdnyakova                                                  |
| Address     | 1b Akhmetov Str., 2 Floor, Office 245                               |
| Telephone   | +7 708 115 05 14                                                    |
| Email       | Mariya.Pozdnyakova@tav.aero                                         |
| Website     | <a href="https://alaport.com/en-EN/">https://alaport.com/en-EN/</a> |

- 18.8.4 The Engineering, Procurement and Construction (EPC) Contractors will assign their own CLO to interact with sub-contractors' workforce and local communities as necessary. Grievances and comments should be sent to the ALA CLO (contact details provided in Table 18.1), where possible by using the form provided in the SEP.

## Appendix 18.A: Public consultation announcements

### Общественные обсуждения

Информируем вас о проведении общественной консультации по оценке воздействия на окружающую среду и социальную сферу (ОВОСС) инвестиционного проекта Горизонт – комплексной программы модернизации Международного аэропорта Алматы (МАО).

Проект модернизации МАО призван обеспечить рост пропускной способности, сохранить качество сервиса и поддержать устойчивое развитие.

ОВОСС выполнена компанией Mott MacDonald Ltd при поддержке TOO EcoSocio Analysts согласно международным стандартам.

**Дата и время:** 7 сентября 2025 года, 11.00.

**Место:** ул. Майлина, 42, Дом культуры.

**Материалы будут размещены на официальном веб-сайте МАО и портале EcoPortal. Комментарии и отзывы принимаются до 6 октября 2025 г. на эл. почту ESdepartment@tavairports.onmicrosoft.com или по тел. +7 708 115 05 14.**

### ҚОҒАМДЫҚ ТАЛҚЫЛАУ

Сіздерді «Горизонт» инвестициялық жобасының – Алматы халықаралық әуежайын (АХӘ) жаңғыртуға арналған кешенді бағдарламасының қоршаған ортаға және әлеуметтік салаға әсерін бағалау (ҚОӘСӘБ) бойынша қоғамдық талқылауға шақырамыз.

АХӘ жаңғырту жобасы өткізу қабілетін арттыруға, қызмет көрсету сапасын сақтауға және тұрақты дамуды қамтамасыз етуге бағытталған.

ҚОӘСӘБ халықаралық стандарттарға сәйкес Mott MacDonald Ltd компаниясы және EcoSocio Analysts ЖШС қолдауымен дайындалды.

**Күні мен уақыты: 2025 жыл, 7 қыркүйек, сағат 11.00.**

**Өтетін орны:** Майлин көшесі, 42, Мәдениет үйі.

Материалдар АХӘ ресми веб-сайтында және EcoPortal порталында орналастырылады. Пікірлер мен ұсыныстар 2025 жылғы 6 қазанға дейін ESdepartment@tavairports.onmicrosoft.com электрондық поштасы немесе +7 708 115 05 14 телефоны арқылы қабылданады.

## Appendix 18.B: Public consultation Q&A

The questions asked and answers provided during the public consultation meeting on 7 September 2025 are provided in the table below:

| ID | Comments / Questions / Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | The asphalt plant near our house is noisy, and we cannot sleep. My child has asthma, and we cannot open the windows. There is a smell of tar, and they have placed a Maylina near us, and road repairs are underway, blowing in our direction. We cannot sleep, and we have not had enough air for a week, so we came here. My child is disabled and hasn't been able to sleep for a week. He has high blood pressure. We went to the doctor, who said the plant was the cause. We live in Kyzyltu (Almerik). The dust and tar are unbearable. | ALA recorded the concern, exchanged contact details with the residents, and committed to investigating the source of the odour. The CLO will provide follow-up feedback.<br><br>(The CLO has checked the area and could not find the source of the odour, but predicted the options of the odour in that area, but it is not from airport. The plant will be in that area, it is the mobilization stage).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2  | 1. Are you from the airport or from council?<br><br>2. I have a question about the garages. How will it work and when will it happen? Has it been decided? What will it look like? Will it happen at all? What will be there?                                                                                                                                                                                                                                                                                                                  | 1. There are representatives from the airport and the council's office here, so you can ask your questions, and we will try to answer them.<br><br>2. Good afternoon, the issue of garages is not included in this project as a whole. However, we have submitted an application to purchase these garages on Akhmetova Street, 600 garages. We plan to make the purchase because we do not have enough space. Currently, we are receiving numerous complaints about taxis; people cannot park in their yards because everything is blocked by people picking up and dropping off passengers. The airport has limited space where they can park, so a decision was made to submit a proposal to buy these garages. This is a matter for the city council; it does not concern the airport. The meeting is only about the expansion of the airport; the garage issue is not relevant here. |
| 3  | Does the noise insulation program include regular houses or apartment buildings as well? Are the old apartment buildings on Akhmetova Street included? So, you will come at the beginning to see how noisy it is?                                                                                                                                                                                                                                                                                                                              | This is only for private homes. We will stay in touch with you, we will inspect where the house is located, what it looks like, and what can be done.<br><br>First, we will check two maps with your address, see what impact it has, and then inspect the house with our technical service colleagues and consult with them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 4  | How can you soundproof a three-story house? Is this technically possible or not?<br><br>I have the house on the very edge.<br><br>How can you soundproof a three-story house?                                                                                                                                                                                                                                                                                                                                                                  | Our technical office is not present today. These are the people who participate in the inspections of all houses, and we can also contact them and see where they are located. On our red map.<br><br>We will consult with specialists.<br><br>By replacing the windows with double-glazed ones with thick glass and large openings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 5  | We contacted the Talgar district council regarding house legalization. We have all the documents; we just wanted to update them. I already asked Mariya this question. My brother came to the Talgar district council about this issue, and they sent us to the airport to get a certificate from the airport stating that we are in the red zone and that they allow us to do so. The house was built in the 1940s and is still there. These were divided plots, and they won't give                                                          | You need to visit Guldala council, we will re-solve the issue. There is no need to contact the airport                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



---

us a certificate from the airport. And they won't let us move for-ward, we have all the documents, we just need to update them. Where can we go with this issue?

---

- 6 Your connection drops when the plane flies over our house. The internet doesn't work at all. We're working on the computer, the plane takes off, and the internet drops. We contacted the operator, and they said there were no problems on our end. Cell service drops.
- Just when the plane takes off, when I'm talking on the phone, the phone drops. The phone shows a malfunction.
- When construction began two months ago, our internet started to completely fail. It doesn't work at all. I called Tele2, and they told me that it was probably due to the airport nearby. There are jammers at the airport, and because of this, the connection is lost. Technicians from the company came and said that there was nothing wrong on their end, everything was fine, and we had no problems. The connection is poor. You can add this to the list.
- 

We have not been approached with this question or issue before. It would be wrong to say anything now; you are the first to ask this question. We will discuss this issue with our colleagues at KazAeroNavigation and get back to you.

## Appendix 18.C: Public consultation photos



## **Appendix 18.D: Public consultation materials**

# PROJECT HORIZON ESIA PUBLIC CONSULTATION



# AGENDA

1 Welcome and Health and Safety Briefing

2 Panel introduction

3 Project Horizon

4 ESIA process and findings

5 Questions and answers

# Purpose of this public meeting

- This public consultation meeting is being carried out as part of the **Environmental and Social Impact Assessment (ESIA)** process.
- The ESIA for Project Horizon is conducted to meet international lender requirements (e.g., IFC, EBRD, DEG).
- This process is separate to the national Environmental Impact Assessment (EIA), which has been conducted to meet Kazakhstan's legal requirements.
- This ESIA consultation is additional and does not replace the national EIA process. Both are important and complementary.

## Why are we here?

- To provide information about the project
- To listen to your views and concerns

## Why are you here?

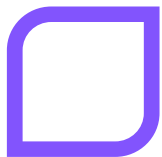
- To participate in the ESIA consultation process
- To find out about the project's potential environmental and social impacts and planned mitigations
- To share your opinions, ideas, and concerns



# Panel introduction

Almaty International  
Airport

The Project Proponent: responsible for the Project Horizon  
development and operation.

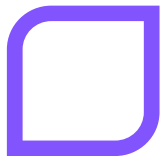


Represented by:



The ESIA Consultant

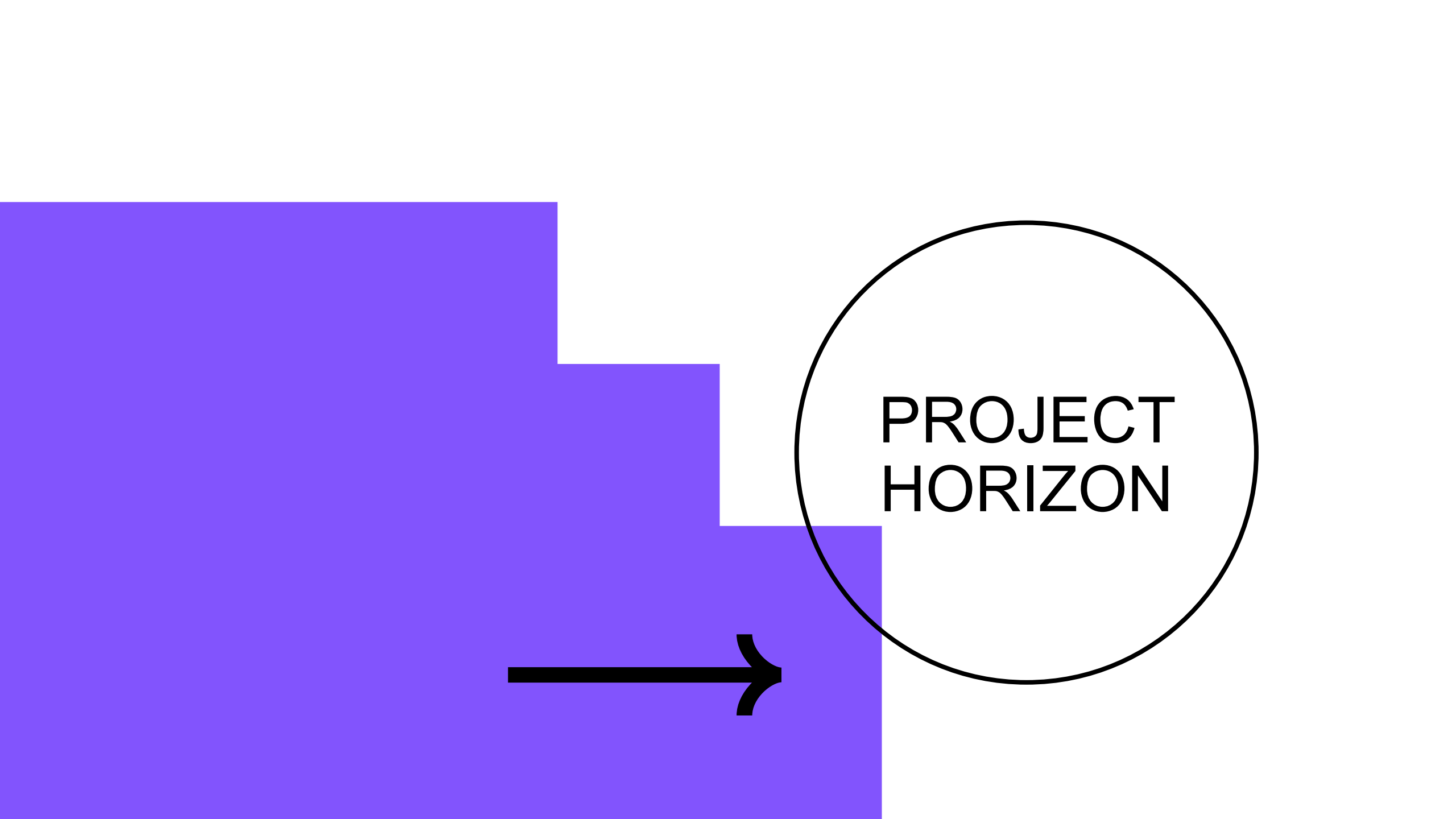
Mott MacDonald and the local sub-consultant EcoSocio  
Analysts: developed the ESIA



Represented by:







A diagram illustrating a project horizon. On the left, a solid purple area is shaped like a descending staircase, with three steps of decreasing width from left to right. A thick black arrow points horizontally from the right side of the purple area towards a circle on the right. The circle has a black outline and contains the text "PROJECT HORIZON" in black, uppercase, sans-serif font, centered within it.

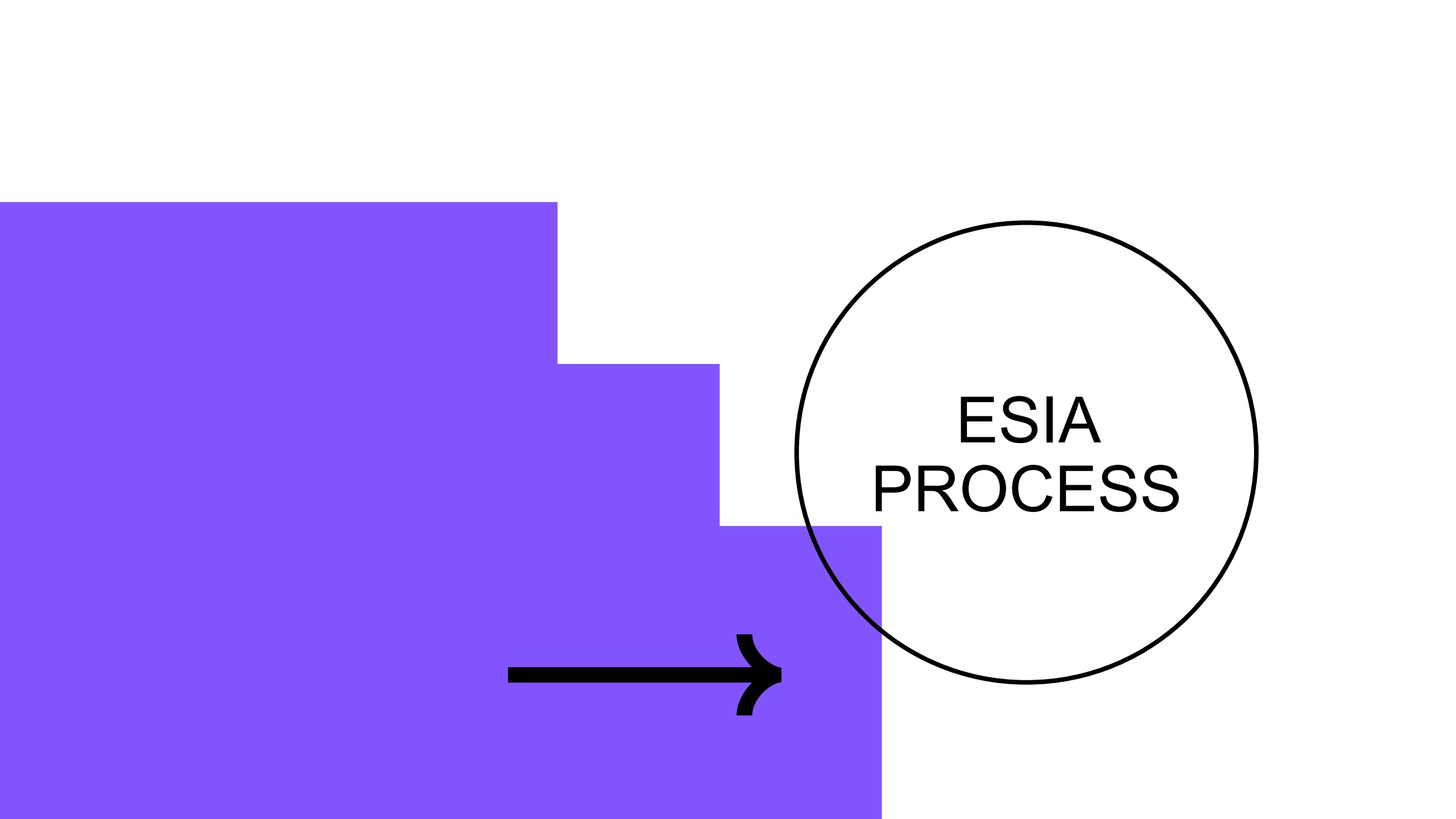
PROJECT  
HORIZON

# Project Horizon – Project components

Project Horizon aims to expand and upgrade key infrastructure at the airport to enhance its capabilities and improve services. These developments include:

- Full depth reconstruction of main runway
- New taxiway
- New cargo apron
- Full depth reconstruction of existing VIP apron
- New de-icing pad
- Rehabilitation of parking stands
- New in-flight catering facility
- Fuel farm storage expansion and improvements to existing fuel farm
- Domestic terminal (T1) renovation
- Drainage and wastewater treatment
- New head office and training centre
- Aerodrome and ground handling village
- New landside and airside warehouses
- Other improvements

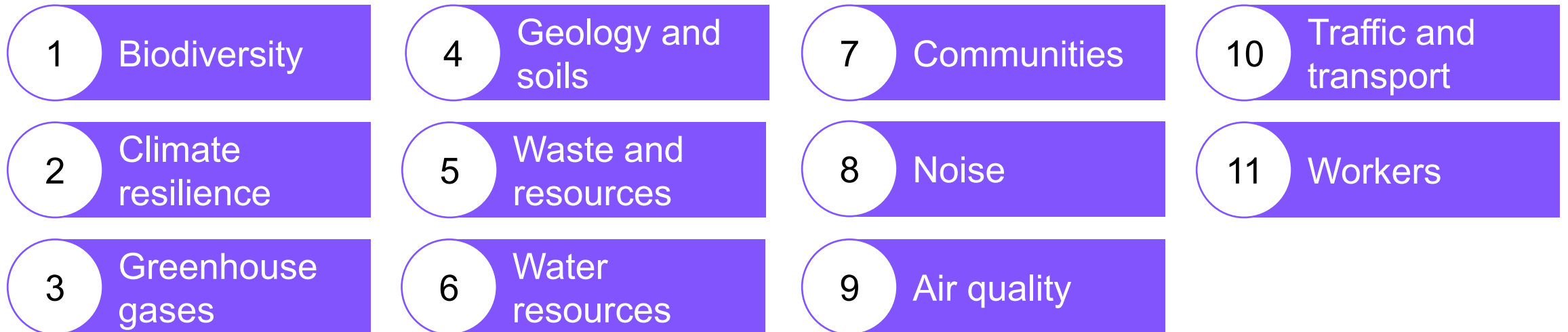




ESIA  
PROCESS

# The ESIA

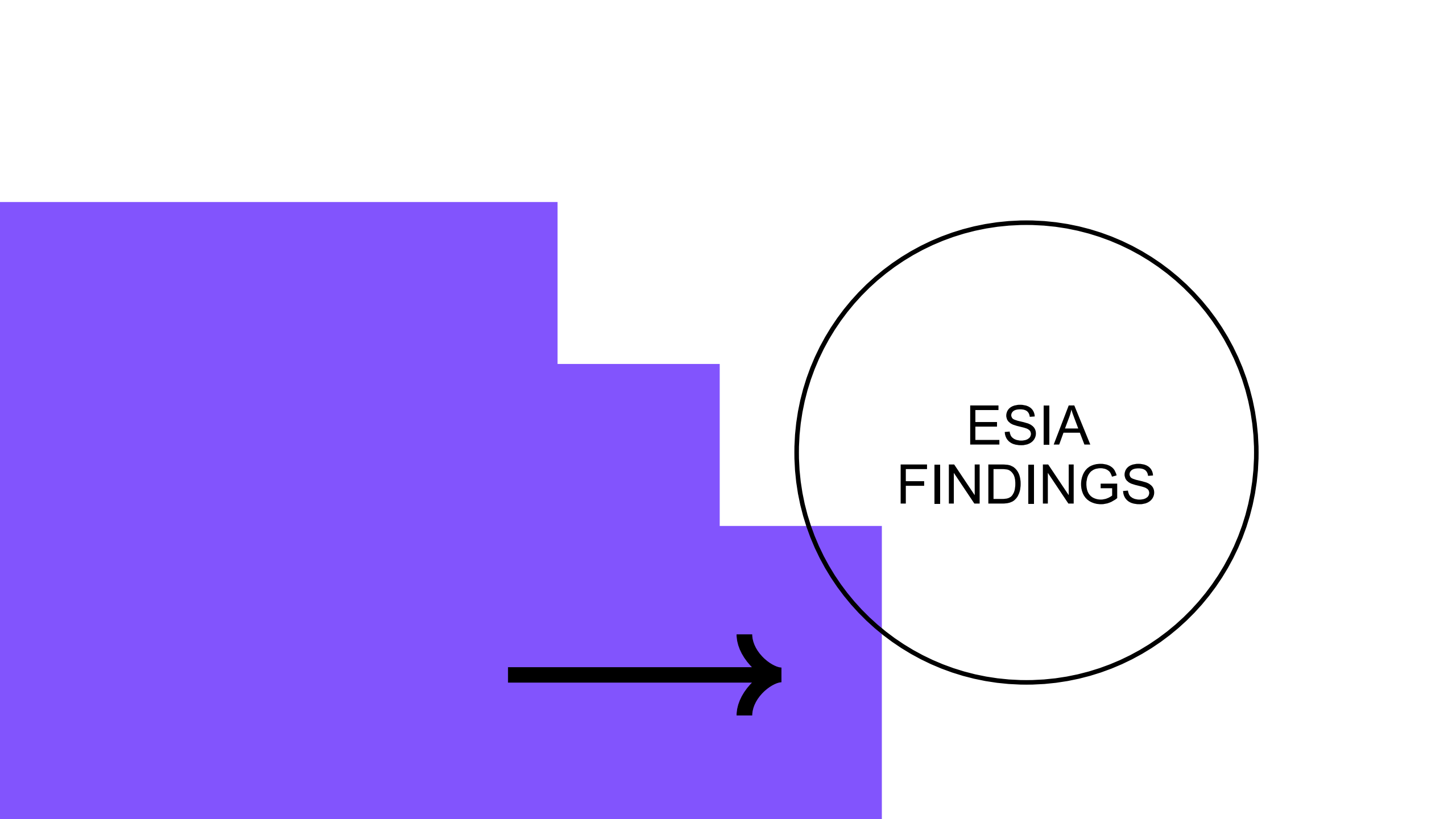
- Undertaken to comply with international best practice guidance for the development of international ESIAs (in particular the IFC Performance Standards and the EBRD Environmental and Social Requirements).
- Has taken into consideration the existing environmental and social conditions.
- Identifies possible impacts and measures that can be taken to avoid, minimise, and mitigate any adverse impacts.
- Covers the following topics:





The ESIA must:

- ✓ Present clearly an assessment of the impacts based on the terms of reference established during scoping
- ✓ Identify potential direct, indirect, cumulative and transboundary impacts on the environment and social context, covering the pre-construction, construction and operation stages
- ✓ Provide mitigation, enhancement, management and monitoring measures to address the impacts identified



ESIA  
FINDINGS

# Biodiversity

The biodiversity assessment considered impacts on habitats, plants and animals. The current airport habitats consist of hardstanding and areas of vegetation that are managed in order to reduce the risk to airport operations from wildlife movements. No ecologically protected sites or rare habitats are anticipated to be affected by the Project.

## **Construction impacts:**

- Minimal impact on habitats
- Disturbance to wildlife due to increased noise levels, artificial lighting and vibration, and exposed excavations during construction

## **Operational impacts:**

Mainly relate to the increased risk of birds strikes due to the increased number of air traffic movements.

To manage this impact, wildlife management procedures, such as regular bird watch patrols and the use of chemical, auditory, visual deterrents for birds, will continue to be implemented to discourage bird species from the airport area. The results will be monitored to ensure their effectiveness is maintained.

## **Construction Environment Management Plan Wildlife Hazard Management Plan**

Following the implementation of the mitigation measures, in both construction and operation phases, there will be no significant effects on habitats, plants or animals.



# Climate Resilience

An assessment was undertaken to determine the impacts of climate change on the operation of the Project. **The construction phase was not assessed**, since construction is planned to be complete by 2028 and therefore will be subject to the current climate.

**During operation**, it is expected that changes in weather patterns (higher temperatures, reduced rainfall, drought, heavy rainfall and high winds) will negatively affect the airport infrastructure and systems, through overheating, deterioration and potential failure of infrastructure components, as well as altered bird activity increasing risk of bird strikes. People, particularly vulnerable groups and outdoor workers may face related health risks. However, winters will tend to be less cold which may offer benefits by lowering the need for snow and ice management.



## Climate Change Risk Assessment (CCRA)

Following the implementation of the CCRA study mitigation measures, no significant effects are expected on the airport, workers and passengers from climate change.

# Greenhouse gases

## **Construction impacts:**

- Carbon emissions resulting from the manufacturing and transportation of materials to be used for constructing the project, and fuel use for construction machinery and equipment.

## **Operational impacts:**

- Emissions resulting from operational electricity consumption and the increase in flights.

Despite the implementation of mitigation measures, the effects associated with greenhouse gas emissions remain significant during both construction and operation.

# Geology and Soils

- The fuel farm and other construction areas are being assessed for potential historic contamination.
- During both construction and operation, there may be accidental spillages and leaks with potential to result in ground and/or groundwater contamination. These will be managed by the Spill Prevention Plan.

## Natural Hazards

- The Project is located in a region with known seismic activity. To reduce risks from earthquakes, national regulations require all construction to follow strict building codes that improve safety and resilience. A government-led monitoring system is in place across the country to track seismic events and support emergency response.

## Emergency Preparedness and Response Plan (EPRP)

Following the implementation of mitigation measures, no significant effects are expected for geology and soils.

# Waste and Resources

- **During construction**, a significant volume of construction waste is expected to be generated by the Project (construction waste, mishandling/surplus construction material, packing material, municipal solid waste). This will be managed according to Waste Management Plan.
- **During operation** there will be additional capacity for passengers and cargo. Therefore, the volume of waste from the catering and hospitality of workers and passengers, packaging, maintenance and cleaning will be increased.
- Effects associated with waste during both construction and operation include contamination of the environment due to mismanagement of waste; dust from poor handling and storage; visual impacts from poor storage; health and safety hazards from poor storage; and increased pressure on existing landfill capacities and increase in waste transportation.



## Waste Management Plan

Following the implementation of mitigation measures, no significant effects are expected for waste and resources.



# Water Resources

## Construction impacts:

- Increase in the risk of contamination to surface water through accidental spills and dust generation.
- Increase in flood risk due to construction activities altering the flow paths of the surface water or increasing the amount of surface water runoff in localised areas.
- Disturbance of the ground from piling could lead to disruption of natural groundwater flow paths.



Sampling location for ALA Ground water monitoring.

## Operational impacts:

- Higher levels of pollutions due to the increase in the number of aircraft and support, particularly through routine surface runoff, potentially damaging the water quality of both surface water and groundwater.
- Increase in impermeable surfaces impacting flow and runoff, resulting in a requirement for improved drainage. A new drainage system will be constructed as part of the project.
- Rising passenger numbers over the Project's lifetime are expected to increase the demand for drinking water.

## Water Management Plan

Following the implementation of mitigation measures, no significant effects are expected for water resources.

# Communities

## Social Impact Assessment (SIA)



### Survey Areas for Community Consultation

To understand how airport operations might affect nearby communities, we carried out surveys in four neighborhoods: Turksib, Guldala, Almerék, and Panfilovo.

These areas were chosen because they are expected to experience the most noise once the project is operational. We collected local data through household surveys, interviews, and community mapping. In total, 430 people took part in Zone A (including 213 women), and 160 in Zone B, helping us gather valuable insights into community concerns and priorities.

- Almaty International Airport
- Airport boundary 1.5km buffer
- Zone A survey location
- Zone B survey location
- Future impacted area

# Communities

## Construction impacts:

- Generation of opportunities and revenue for local/regional and national suppliers, which will boost the local economy.
- Minor disruption to existing businesses in or around the airport such as congestion, higher levels of noise and air pollution which may affect customer access.
- Temporary increase in traffic around the airport during construction.
- Temporary disturbance to local community due to noise, dust, increased road traffic and waste generation.

## Operational impacts:

- Creation of direct jobs within the airport itself as well as indirect employment in sectors like hospitality, retail, and transportation.
- Potential increase in air traffic noise affecting local communities, mitigated by ALA's Noise Insulation Program.
- Potential increase in road traffic in and around the airport.
- If there are any land acquisition impacts related to public health and safety, they will be decided by relevant authorities, will be kept minimal and announced beforehand to allow adequate consultation with any affected community member.

## Community Management Plan

**+co-related topics management plans (e.g. air quality, noise, road traffic)**

Following the implementation of mitigation measures, no significant construction effects are expected, however significant operational effects are expected, both adverse and beneficial. A Noise Insulation Program is already in place since 2023 and its implementation is expanding starting with the highest impacted households.

# Noise

## Construction impacts:

Noise and vibration is expected to arise during construction activities including:

- Critical infrastructure: reconstruction of the runway, new taxiway, VIP apron reconstruction and de-icing pad
- Operational enhancement: Cargo apron, parking stands, catering facility, fuel infrastructure
- Supporting infrastructure: Renovation of T1, drainage, head office and training centre, aerodrome and ground handling

## Operational impacts:

Changes in operational noise are expected to arise due to:

- Projected growth in passenger numbers and aircraft movements
- Transfer of use from the southern runway to the rehabilitated northern runway
- Transfer of use from western take off and landing routes to eastern take off and landing routes
- Modernisation of the aircraft fleet, eliminating the noisier Chapter 3 aircraft types and introducing quieter Chapter 14 aircraft

## Noise Management Plan (including Noise Insulation Program)

A Noise Management Plan will be in development 2025 to 2026

The Noise Insulation Program mitigates eligible buildings (exposure to aircraft noise  $L_{night} > 60 \text{ dB(A)}$ ) and prioritises vulnerable receptors.



# Noise

## Noise Monitoring and Insulation Program



### ТҰРҒЫН ҮЙЛЕРДІ ШУДЫ ОҚШАУЛАУ БАҒДАРЛАМАСЫ

**Бұл не?**  
Тұрғын үйлерді Шуды оқшаулау бағдарламасы (ШОБ) – «Алматы халықаралық әуежайы» АҚ әуежайы маңында орналасқан тұрғын үйлерге авиациялық шудың әсерін азайтуға бағытталған бастама. Бағдарлама әуежайдың қаржысы есебінен жүзеге асырылады.

**Қалай өтініш беруге болады?**  
Төменде көрсетілген байланыс нөмірлері арқылы әуежай қызметкерімен хабарласып, бағдарламаға қатысу ниетіңізді білдіріп, өз атыңыз бен үйіңіздің мекенжайын хабарлауыңызды сұраймыз.

**Бағдарламаның негізгі кезеңдері:**  
Үй ішіндегі шу деңгейін өлшеу;  
Үйдің құрылымын мердігер тарапынан тексеру және жұмыс жоспарын әзірлеу;  
Әуежай, мердігер мен сіздің арасындағы келісімшартқа қол қою;  
Жәнеу жұмыстарының басталуы;  
Үйдегі шу деңгейін қайта өлшеу.

**Жиі қойылатын сұрақтар:**  
1. Бағдарламаға кімдер қатыса алады?  
Түнгі уақытта шу деңгейі 60 дБ-ден асатын Алматы әуежайының маңында орналасқан тұрғын үйлер.  
2. Бұл қанша тұрады?  
Барлық жұмыстар тұрғындар үшін тегін жүргізіледі, шығындарды әуежай өтейді.  
3. Қандай жұмыстар атқарылады?  
Негізгі жұмыстарға қолданыстағы терезелерді жақсартылған терезелерге ауыстыру, сондай-ақ қажет болған жағдайда шатыр мен төбенің шу оқшаулауы кіреді.

Байланыс ақпараты:

## Noise Insulation Program

Total participants: 167 houses.  
61 houses completed insulation.  
75 houses will be completed by end of 2025. 31 houses will be inspected.

<https://alairport.com/kk-KZ/passenger-guide-kz/terminal-construction-kz/page/noise-insulation-program-kz>

<https://alairport.com/ru-RU/passenger-guide-ru/terminal-construction-ru/page/noise-insulation-program-ru>

# Air Quality

## Construction impacts:

- Dust generated from construction activities, which will be managed with measures such as minimising dust from on-site sources, using dust suppression techniques, containment of dusty processes, etc.
- Emissions from mobile sources (on-road and off-road vehicles) and generators, however these are considered to be negligible.

## Operational impacts:

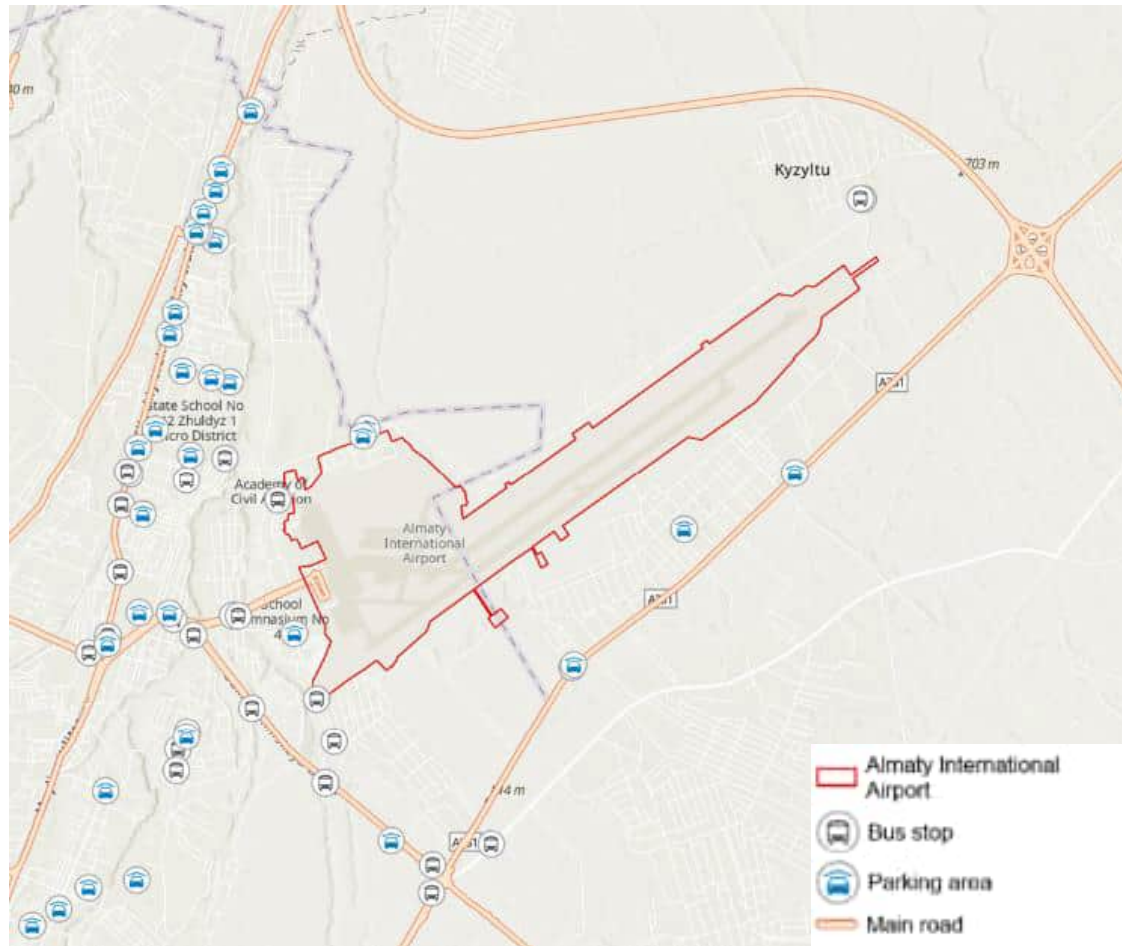
- Expected increase in operational traffic (air and road) will result in an increase in pollutant concentrations for nearby receptors. To manage these impacts, a strategy will be developed and implemented to reduce emissions associated with increased operational traffic.
- Increase in emissions from airport activities on airport workers and on receptors located in nearby villages, however these are considered to be negligible.

## Air Quality Management Plan

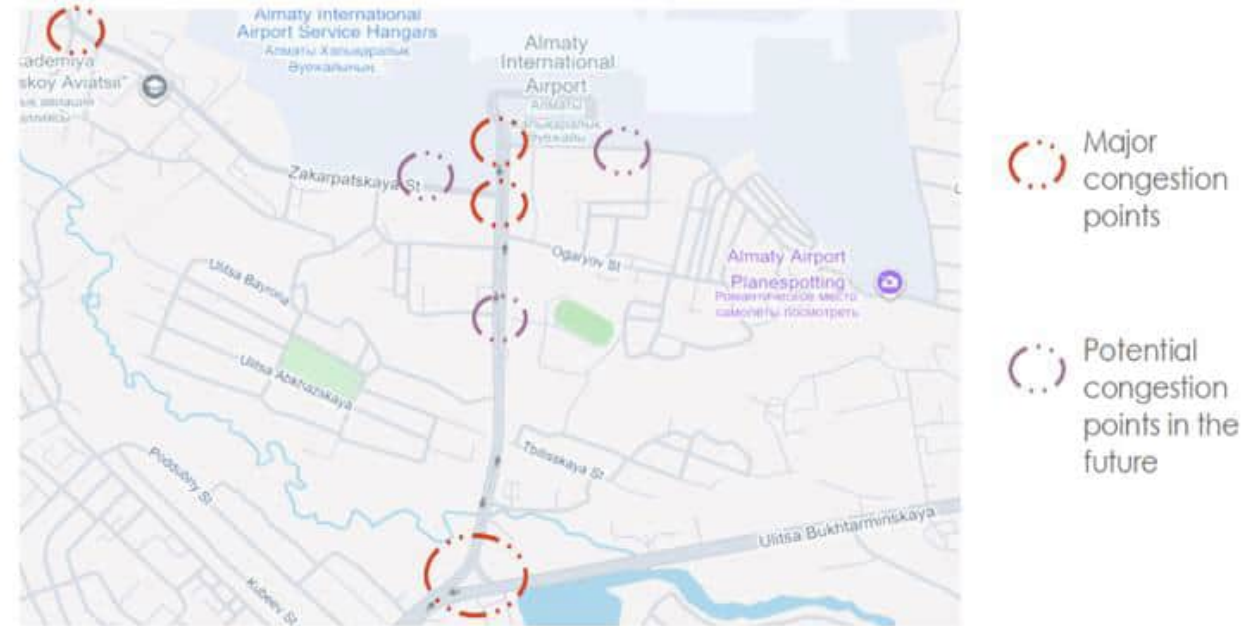
Following the implementation of mitigation measures, the construction effects are considered negligible, however operational effects associated with the increase in pollutant concentrations on air quality as a result of operational traffic (air and road) remain significant.

# Traffic and Transport

## Transport network around Almaty International Airport



## Congestion points - current and potential future



# Traffic and Transport

## Construction impacts:

- Increase in traffic due to construction activities.
- Potential deterioration of roads due to truck movements.
- Decrease in road safety with the likely increase in truck movements.
- Increased nuisance on sensitive receptors

## Operational impacts:

- Additional traffic load on the existing road network (albeit lower than construction) primarily due to truck movements related to cargo transport and airport servicing activities.
- Road traffic is expected to grow due to passenger movements including the use of private cars, shuttle buses and taxis, which will increase stress on an already congested local road network outside of the airport.

## Traffic Management Plan

Following the implementation of mitigation measures, no significant effects are expected for traffic and transport.

# Workers

## **Construction impacts:**

- Temporary employment opportunities; at present over 400 workers are estimated to be needed for the construction of some elements of the project
- Project induced in-migration
- Potential temporary increase in noise, dust and construction related traffic
- Risks to workers' occupational health, safety and wellbeing, and labour rights during construction.

## **Operational impacts:**

- Permanent and longer-term employment opportunities; as of June 2025, ALA was recruiting for almost 400 new positions
- Risks to operational workers' occupational health, safety and wellbeing during operation

## **Occupational Health Safety and Wellbeing Management Plan**

Following the implementation of mitigation measures, no significant construction effects are expected and a significant beneficial effect during operation is expected.



# Summary of residual effects

| Topic                 | Construction effects  | Operational effects                                    |
|-----------------------|-----------------------|--------------------------------------------------------|
| Biodiversity          | Not significant       | Not significant                                        |
| Climate resilience    | N/A                   | Not significant                                        |
| Greenhouse gases      | Significant (adverse) | Significant (adverse)                                  |
| Geology and soils     | Not significant       | Not significant                                        |
| Waste and resources   | Not significant       | Not significant                                        |
| Water resources       | Not significant       | Not significant                                        |
| Community             | Not significant       | Significant (adverse and beneficial)                   |
| Noise                 | Not significant       | Significant (adverse)                                  |
| Air quality           | Not significant       | Significant (adverse)                                  |
| Traffic and transport | Not significant       | Not significant                                        |
| Workers               | Not significant       | Not significant (adverse) and Significant (beneficial) |

# Cumulative Impacts

## Key findings:

- **Noise & Air Quality:** Combined impacts from aircraft, traffic, and construction may affect health and wellbeing.
- **Traffic Congestion:** Increased vehicles from the airport and nearby projects may worsen road conditions.
- **Community Wellbeing:** Long-term exposure to stressors like noise, pollution, and legal uncertainty may reduce quality of life.
- **Safety & Security:** Overlapping risks from construction and operations may challenge emergency response systems.

## Mitigation includes:

- Expanding the Noise Insulation Programme (NIP)
- Improving traffic planning and public transport links
- Strengthening community engagement and grievance mechanisms
- Coordinating with city planners to manage cumulative risks





# Environmental and Social Framework

Almaty International Airport has a certified environmental management system (ISO 14001) to manage environmental and social risks. This system will be updated to include specific measures for the new project.

## **A dedicated team will:**

- Oversee the Environmental and Social Management Plan (ESMP)
- Coordinate with contractors and consultants
- Supervise construction-related E&S plans
- Ensure compliance with regulations and commitments
- Provide training and support for continuous improvement



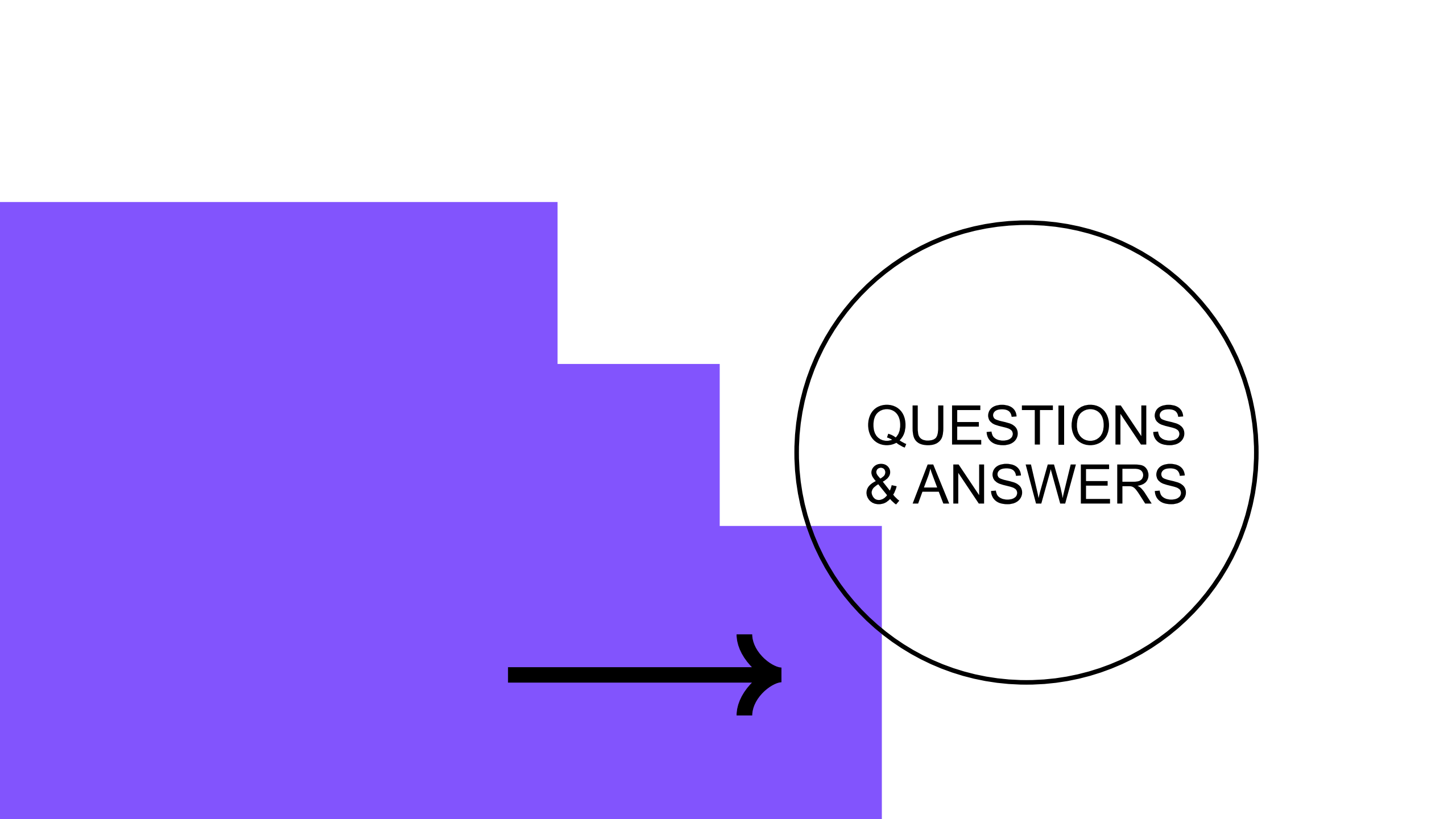
# Stakeholder Engagement and Public Consultation

## Stakeholder Engagement Plan (SEP)

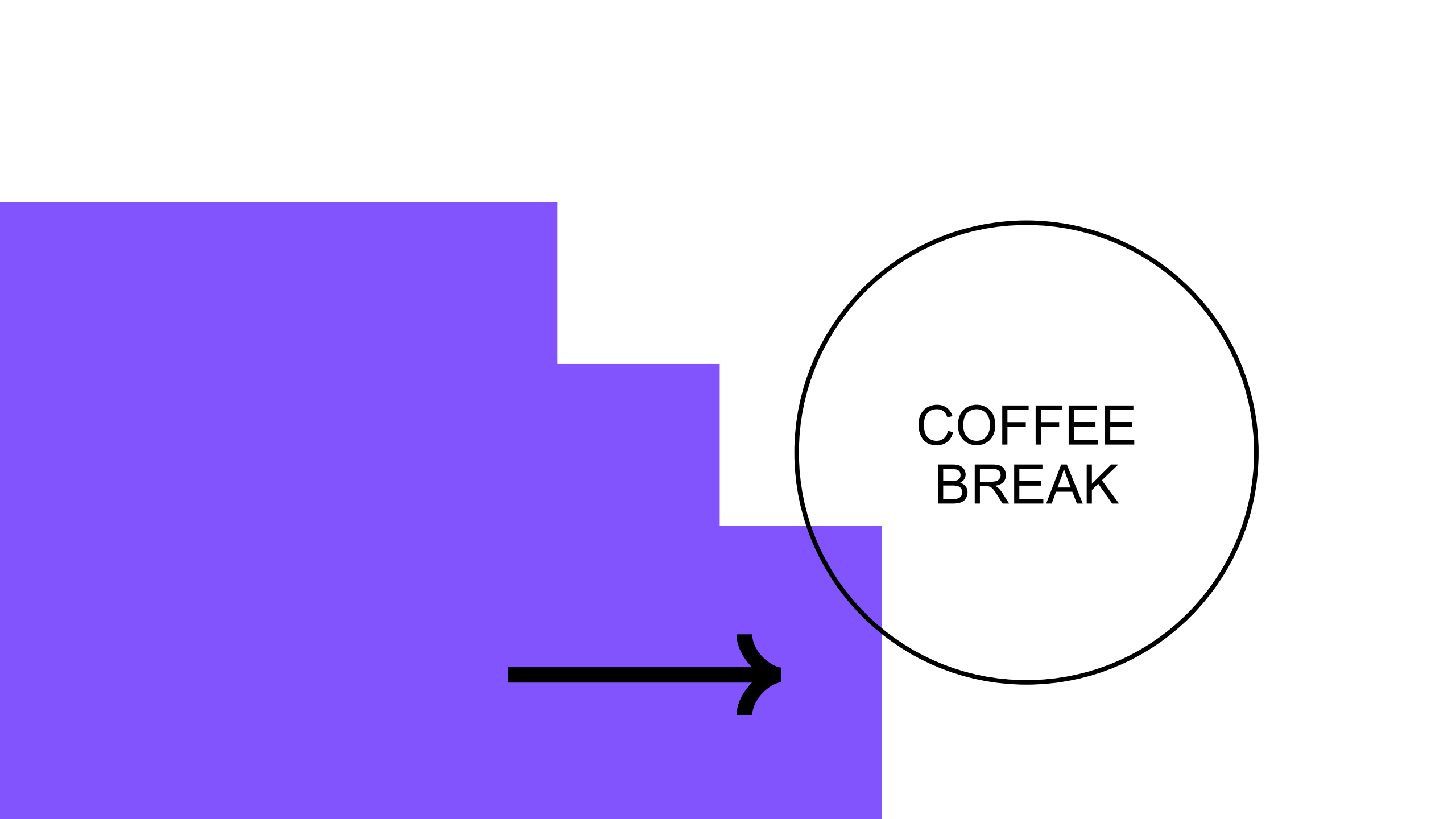
- ALA has updated its SEP (originally prepared in 2022) to include the Project Horizon. The SEP provide guidance for ongoing inclusive and respectful consultation.
- The Project Horizon Draft ESIA and Non-Technical Summary (NTS) will be available online on Lender's and ALA's website, in English, Russian and Kazakh languages.
- The documents will also be available in hard copy at Akhmetova 1b, Hotel Aksunkar, 2nd floor, office 245.
- The disclosure date is planned to be on 15 September 2025.
- Stakeholders can submit feedback during a 60-day disclosure period.
- A Grievance Mechanism is in place to handle concerns confidentially and fairly.
- A Community Liaison Officer (CLO) is available to support communication and engagement.

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QUESTIONS  
& ANSWERS



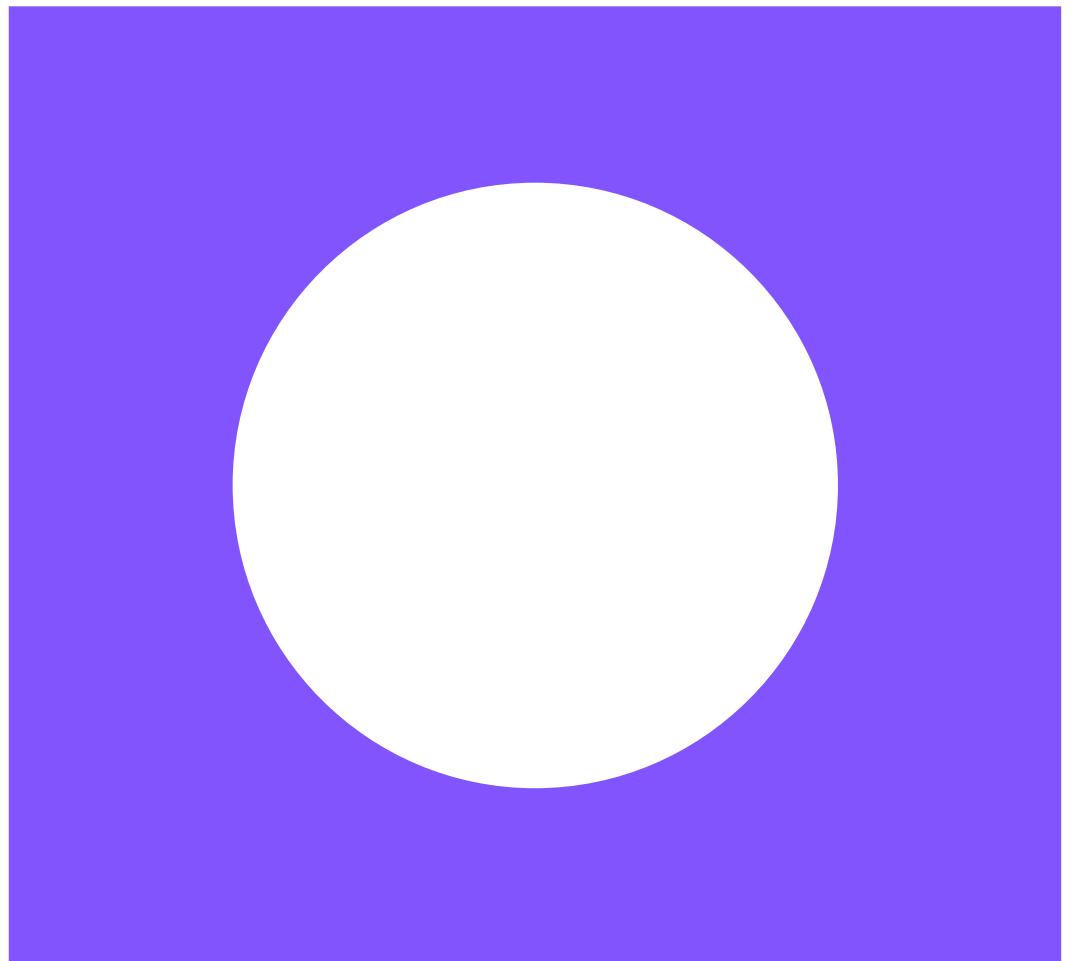
COFFEE  
BREAK

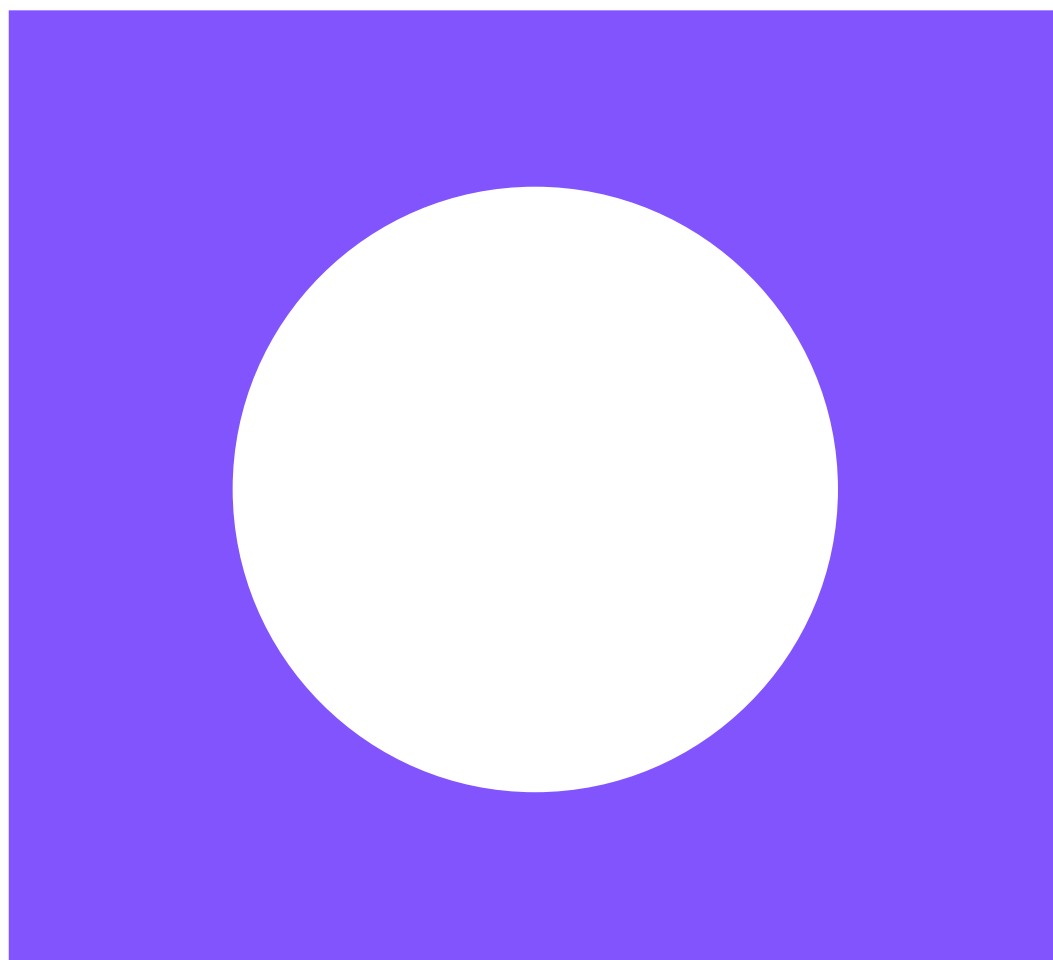
**M**

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MACDONALD**

**M**

**THANK YOU**





# **Almaty International Airport**

Environmental and Social Impact Assessment  
Report - Chapter 19

September 2025

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# **Almaty International Airport**

## **Environmental and Social Impact Assessment Report - Chapter 19**

September 2025



# Issue and Revision Record

| Revision | Date       | Originator | Checker | Approver | Description  |
|----------|------------|------------|---------|----------|--------------|
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# Contents

|                                         |   |
|-----------------------------------------|---|
| Acronyms and abbreviations              | 1 |
| 19 Conclusion                           | 2 |
| 19.1 Introduction                       | 2 |
| 19.2 Mitigation                         | 2 |
| 19.3 Summary of residual effects        | 2 |
| Tables                                  |   |
| Table 19.1: Summary of residual effects | 2 |

# Acronyms and abbreviations

| Abbreviation /<br>Acronym | Definition                                 |
|---------------------------|--------------------------------------------|
| CIA                       | Cumulative impact assessment               |
| ESIA                      | Environmental and Social Impact Assessment |
| ESMP                      | Environmental and Social Management Plan   |
| VECs                      | Valued Environmental and Social Components |

# 19 Conclusion

## 19.1 Introduction

19.1.1 This chapter presents a summary of the residual effects and conclusions of the Environmental and Social Impact Assessment (ESIA) for the Project Horizon. Topic-specific impact assessments are presented in detail in **ESIA Chapters 5 to 15**. **ESIA Chapter 16** presents the cumulative assessment.

## 19.2 Mitigation

19.2.1 Measures to mitigate the effects of the Project have been identified and included within the technical chapters (see **ESIA Chapters 5 to 15**). A framework Environmental and Social Management Plan (ESMP) will be produced and will contain management measures to be incorporated into the construction and operation of the Project. These mitigation measures have been taken into account in the assessment of residual effects for each topic.

## 19.3 Summary of residual effects

19.3.1 Following implementation of mitigation, the environmental effects envisaged to remain are referred to as residual effects. These are described in each topic chapter.

19.3.2 Some design features and mitigation measures may result in an environmental improvement. In these instances, the residual effect is recorded as 'beneficial'.

19.3.3 Table 19.1 summarises the likely significant effects (i.e. residual effects with a significance of Moderate Adverse / Beneficial, or greater). Where more than one residual effect is predicted for a topic, the table presents the worst-case significance.

**Table 19.1: Summary of residual effects**

| Topic                 | Residual effects                                          |                                                               |
|-----------------------|-----------------------------------------------------------|---------------------------------------------------------------|
|                       | Construction                                              | Operation                                                     |
| Air quality           | Not significant (negligible adverse)                      | <b>Significant (moderate adverse)</b>                         |
| Biodiversity          | Not significant (negligible adverse)                      | Not significant (minor adverse)                               |
| Climate resilience    | N/A (scoped out)                                          | Not significant                                               |
| Community             | Not significant (minor adverse and minor beneficial)      | <b>Significant (moderate adverse and moderate beneficial)</b> |
| Geology and soils     | Not significant (negligible adverse)                      | Not significant (minor adverse)                               |
| Greenhouse gases      | <b>Significant (moderate adverse)</b>                     | <b>Significant (major adverse)</b>                            |
| Noise                 | Not significant                                           | <b>Significant (moderate to major adverse)</b>                |
| Traffic and transport | Not significant (minor adverse)                           | Not significant (minor adverse)                               |
| Waste and resources   | Not significant (minor adverse)                           | Not significant (minor adverse)                               |
| Water resources       | Not significant (minor adverse)                           | Not significant (minor adverse)                               |
| Workers               | Not significant (negligible adverse and minor beneficial) | <b>Significant (moderate beneficial)</b>                      |

19.3.4 The cumulative impact assessment (CIA) identified cumulative effects of **moderate adverse significance** across key Valued Environmental and Social Components (VECs), including noise and air quality, traffic, and community wellbeing. These impacts arise from intra- and inter-project pathways, particularly affecting vulnerable areas.

- 19.3.5 Mitigation measures focus on adaptive management, stakeholder engagement, and coordinated planning to support resilience. These will be integrated into the ESMP and monitored throughout the Project lifecycle. Engagement with affected communities will be maintained to support collaborative mitigation and long-term sustainability.
- 19.3.6 Overall, with the implementation of the proposed mitigation and management measures, the Project is expected to remain environmentally and socially acceptable, with residual and cumulative effects managed through established frameworks and ongoing monitoring.

