

# Independent Expert Report

Independent assessment of ASX's Assurance Program for its Implementation of the CHES Replacement Program

Six Monthly Progress Report

30 June 2022

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# 1. Executive Summary

## Introduction

ASX Operations Pty Ltd (“ASX”) is undertaking a project to replace its Clearing House Electronic Subregister System (CHES) with a new implemented system based on distributed ledger technology (CHES Replacement Program).

ASX has developed an Assurance Program in connection with the CHES Replacement Program, with the purpose of providing confidence to internal and external stakeholders and assisting in ensuring that the project meets its objectives. The Assurance Program is part of the critical path of the project and includes a number of reviews focused on important project milestones and key risk areas.

In November 2021 ASIC imposed certain Licence Conditions on ASX Clear and ASX Settlement which included the appointment of an independent expert.

## Scope

In accordance with the relevant Licence Conditions, ASX, with ASIC’s and the RBA’s consent, engaged EY to assess ASX’s Assurance Program for its implementation of the CHES Replacement Program and oversee the implementation of any remedial actions from the trade outage independent expert review recommendations which are relevant to the CHES Replacement Program.

On 28 February 2022, we issued our first report on the design assessment of the Assurance Program to determine whether it was fit for purpose, identifying any topics that required further independent assessment and any remedial actions.

This is our second independent expert report under the Licence Conditions.

The objective of this report is to provide an update on the status of the remedial actions from the Design Report and the progress of completed

assurance activities. This report also includes an update on the trade outage independent expert review recommendations relevant to the CHES Replacement Program. Refer to section 2.2 for scope details.

## Approach

Our activities included conducting interviews with key ASX project stakeholders to gain an understanding of key project updates, including timeline, alignment of project risks to assurance activities, outcomes of assurance activities and remediation activities; and interviews with third party assurance providers to obtain further clarity on the scope, approach, findings and recommendations from the assurance reviews completed to date.

To inform and evidence the interviews, we inspected Statements of Work (SOWs), Planning Memos and Final Reports from assurance reviews and other key artefacts related to the Assurance Program, including relevant governance reporting packs and evidence of remediation activities have been inspected for appropriateness. Where relevant we performed sample testing. For example, to assess issue closure of completed assurance reviews. Professional scepticism required that our review of issue closure was based on the artefacts that supported the closure at the time, rather than present day interviews with those involved in historic closures. Refer to section 2.3 for approach details.

## Summary findings and recommendations

Since our last report, the Assurance Program has continued to mature, and has added an experienced senior program manager to its team. Our findings in this period relate to continuing to strengthen the Assurance Program to meet the rising volume and complexity of assurance activity ahead.

Based on our findings below, our assessment found that the Assurance Program continued to be fit for purpose, subject to ASX addressing our two recommendations.

- ▶ **Design Assessment Update** – We found ASX had fully addressed all 3 of our recommendations from our Design Report.

We found that governance process of the Assurance Program should be improved to adequately track and close remedial actions from the assurance reviews. For the improvement of the governance process refer to the recommendation below in “Assessment of the findings from the completed assurance reviews”.

We have no other findings in relation to the scope and depth of the Assurance Program.

- ▶ **Assessment of the findings from the completed assurance reviews**  
ASX has received 8 reports since November 2019 relating to the assurance reviews completed for project governance, testing approach, security design and test, identity and access management, data migration, technology and operation controls. Our assessment of the historically completed 8 reports found that for 3 out of 8 reports the project Risk Rating matrix had not been consistently applied where the third party provider did not include risk rankings in their reports or applied their own risk rankings.

We also found through document review that for 7 out of 68 closed findings from completed assurance reviews, the artefacts captured to demonstrate the closure of the remedial actions were not sufficient to satisfy the Assurance Program’s closure requirements at that time. Given the historic nature of these assurance activities, whereby the related findings have been superseded by other activities within the Assurance Program, we do not recommend revisiting the activities or evidence to support the closure decisions.

Remedial actions for 3 out of 13 completed reviews are tracked outside of the Assurance Program. PMO receives updates on the status of the remedial actions as part of the ESG committee however, it has limited visibility on the validation performed over the closure of those findings.

**Recommendation 1:** We recommend ASX improve the following aspects of the Assurance Program governance:

- a. The validation and evidence capture process of the closure of findings should be consistently applied to all assurance reviews.
- b. The Assurance Program should consistently apply the Risk rating scale for all assurance reviews to allow a more robust impact assessment to the CHES replacement project. If this is not possible, a process should be put in place whereby each finding goes through a formal risk assessment process to evaluate the impact to the CHES Replacement Project.
- c. Findings that are being raised as defects and tracked by other teams should be periodically reported to the Assurance Program to ensure they are appropriately tracked in a centralised manner.

- ▶ **Assessment of the remedial actions from the trade outage Independent Expert review recommendations** - Our assessment found that there were 3 recommendations from the report that were assessed to be ‘Not Ready’ at the time the report was issued. Those recommendations were related to go-live events, testing programs and end of project lifecycle. The Program assessed itself as ‘Not Ready’ to implement such actions based on the progress during that time. Due to the status of these items, the associated remedial actions had not been initially tracked but ASX has subsequently included these in the centralised monitoring process.

We acknowledge that the recommendation in “Assessment of the findings from the completed assurance program reviews” to improve the process around tracking and closure of remedial actions previously mentioned should address this particular finding.

**Go/No go criteria definition and reporting** - Our assessment of the evidence supporting the April 2022 go/no go decision for ITE2 onboarding, including ESG decision packs meeting minutes, found

that there was sufficient information and challenge to support the decision.

We found that one of the technical decision criteria did not use defined ASX terms and so was open to interpretation. It did not define with clarity what is considered as 'sufficient controls' and the tolerance of acceptable defects as a result of the testing. This is in contrast to other criteria that used defined ASX framework terms, for example 'high' and 'highest' for defect criteria.

These findings, while important, are not material to the overall go / no go decision for ITE2 onboarding and we do not question the decision taken.

**Recommendation 2:** We recommend that ASX improve the precision of this technical criterion using defined ASX taxonomy to outline the acceptable threshold and improve the presentation of final conclusions for each criterion measured in support of future go / no go decisions.

### Next steps

Our next report under the Licence Condition is due on 31 December 2022.

The scope of that report will cover how ASX has addressed the recommendations in this 30 June 2022 progress report, and any update

on the implementation of any remedial actions from the completed assurance activities.

In April 2022 ASX announced that the go live date for the CHES Replacement Program would be subject to a replan as the April 2023 date was at risk. The Assurance Program is adding an assurance activity over the replan, and we will consider and report on this, as well as the replan impact on the Assurance Program plan, in our next report. Our activity will include engaging with external stakeholders.

We acknowledge and thank ASX for its cooperation in undertaking our independent assessment activities to date.

## 2. Introduction

### 2.1 Background

#### CHES Replacement Program

ASX commenced a process of evaluating replacement options for its Clearing House Electronic Subregister System (CHES) in 2015. CHES is used by ASX as a core system to perform clearing, settlement and other post-trade services for the Australian equity market.

In December 2017, ASX announced the decision to replace CHES implementing a new system based on Digital Asset's (DA) distributed ledger technology (DLT), project known as the 'CHES Replacement Program'. There are four key objectives/goals for overall CHES Replacement project plans to achieve:

- ▶ To replace the CHES system which is based on ageing technology
- ▶ To adopt international messaging standards (ISO20022) and enable the retirement of proprietary CHES messaging
- ▶ To comply with regulatory expectations to be capable of implementing settlement services that are multi-CCP compatible
- ▶ To develop and enable new business services in relation to clearing and settlement made possible by a flexible and secure system design using contemporary technology providing DLT optionality

Since then, ASX has completed public consultation and opened a Customer Development Environment (CDE) for customers to design, build and test the system. ASX is also scheduled to create an Industry Test Environment (ITE) to support industry wide testing prior to Go-Live.

The key milestones established in the project plan are the following:

- ▶ ITE1 (Industry Test Environment 1) is the first of two staged releases of the new DLT platform and CHES application to industry ahead of the Go-Live. ITE1 enables software providers to perform functional and non-functional testing and to complete any developments they have been implementing. The onboarding of all software providers has been completed except for 2 providers.
- ▶ ITE2 (Industry Test Environment 2) is the second staged release to open the new DLT platform and application for CHES users to complete user testing and develop their operational readiness, following the ITE1 milestone. Applying the learnings and experience from ITE1, the ITE2 milestone was split into two phases: ITE2 onboarding and ITE2 opening. The ITE2 onboarding commenced on 27 April 2022 following a 'Go' decision endorsed by Executive Steering Group (ESG) on 21 April 2022. The CHES Replacement Project is currently going through a re-planning exercise which will determine the date for the ITE2 opening and an updated timeline on future project milestones.
- ▶ Go-Live: expected Go-Live date of the CHES Replacement project will be determined following the re-planning activities.

#### CHES Replacement Program Assurance Program

ASX has developed an Assurance Program with two key purposes:

- ▶ Assist in ensuring the project meets its objective of the successful replacement of CHES with a system based on DLT that meets ASX's functional & non-functional requirements (secure, reliable, available, performant, etc)

- ▶ Provide confidence to internal and external stakeholders relating to functional and non-functional aspects of the replacement system and decision-making for key milestones including readiness for go-live.

The Assurance Program has been designed taking a top-down approach with a focus on important project milestones and key risk areas.

The Assurance Program is 'owned' by ASX's Chief Risk Officer as sponsor. The delivery of the Assurance Program is distributed across a number of assurance providers, depending on the subject matter of each topic, including independent experts and ASX Internal Audit.

The outcomes of individual reviews planned in the Assurance Program and their findings are tracked by the Assurance Program workstream within the CHES Replacement Program and reported periodically to the Executive Steering Group (ESG), the ASX Audit and Risk Committee and the Clearing and Settlement (CS) Board.

The Assurance Program is continuously adapting to the changes in the Project whereby specific reviews such as Technology and Operational Control have been moved to align with the revised timing of the Project milestones. In addition, assurance activity covering the re-plan exercise has also been introduced. ASX is hiring a new resource to be focused on supporting the ongoing activities associated to the Assurance Program.

### **ASX Clear and ASX Settlement Licence conditions**

As a related matter, in November 2020 an outage occurred following a major upgrade to ASX's equity trading platform (ASX Trade), called the ASX Trade Refresh project. Consequently, the Australian Securities and Investments Commission (ASIC) and the Reserve Bank of Australia (RBA) required an independent expert review of the ASX Trade Refresh project to be completed. The independent expert made recommendations in seven key categories from this review: risk, governance, delivery, requirements, vendor management, testing and incident management (trade outage independent expert review recommendations).

The combination of the trade outage and the criticality of the CHES Replacement program has led ASIC (as delegate for the Minister) to impose certain Licence Conditions on ASX Clear and ASX Settlement. Australian CS Facility Licence (ASX Clear Pty Limited) Additional Conditions Notice 2021 (No.1) dated 24 November 2021 and Australian CS Facility Licence (ASX Settlement Pty Limited) Additional Conditions Notice 2021 (No.1) dated 24 November 2021, condition 2 on Schedule 1 "Appointment of an independent expert" required ASX to engage an independent third party (independent expert) to conduct an assessment of its existing Assurance Program on its CHES Replacement Program prior to Go-Live and oversee the implementation of any remedial actions from the trade outage independent expert review recommendations which are relevant to the CHES Replacement Program.

## **2.2 Scope**

EY has been engaged to deliver the following scope of work:

1. In accordance with the relevant Licence Conditions, EY will assess ASX's Assurance Program for its implementation of the CHES Replacement Program and oversee the implementation of any remedial actions from the trade outage independent expert review recommendations which are relevant to the CHES Replacement Program.
2. In addition to the Licence Conditions, ASIC has required a Pre Go-Live Confirmation from EY as to our opinion with respect to:
  - a. The Assurance Program meeting its objectives of:
    - i. The successful replacement of CHES with a system that meets ASX's functional and non-functional requirements, and
    - ii. Promoting confidence to internal and external stakeholders

- b. The adequacy of ASX's governance framework for testing, and
- c. The design adequacy of the CHES Replacement Program's 'Go-Live' decision framework (which incorporates both the business decision to implement the new system and implementation activity decision check-points over the cut-over weekend) and whether the decision framework has been followed.

Our engagement will deliver the following reports as required by the Licence Conditions and the Pre Go-Live Confirmation:

- ▶ Design Report that was published on 28 February 2022 included an assessment whether the existing Assurance Program is fit for purpose, identifying any topics that required further independent assessment and any remedial actions.
- ▶ Six Monthly Progress Reports, which will set out an update to the Design Report, providing a status update of existing remedial actions and identifying any further remedial actions, and updating on implementation of any remedial actions from the trade outage independent expert review.
- ▶ Pre Go-Live report, which will set out the status of any remedial actions and whether they are necessary to be undertaken prior to Go-Live and an update on findings of the totality of the Assurance Program reviews indicating whether the remedial actions from the Design Report and Six Monthly Progress Reports and the relevant trade outage independent expert review recommendations have been appropriately implemented by ASX.
- ▶ Pre Go-Live Confirmation requested by ASIC in addition to the Licence Condition
- ▶ Two Post-Implementation Reviews (PIR)

This document refers to the first Six Monthly Progress Report per the agreed scope of work.

The objective of this Six Monthly Progress Report is to assess whether the CHES Replacement Program continues to be fit for purpose giving due consideration to the following aspects of the Assurance Program:

- ▶ **Design Assessment Update.** Evaluate the status of the remediation actions associated with the findings raised in the Design Report and effectiveness of the change management and governance process of the Assurance Program.
- ▶ **Assessment of the findings from the completed assurance reviews.** Evaluate the status on the implementation of remedial actions arising from completed reviews and assess the adequacy of the validation process undertaken over the closure of those actions. Professional scepticism required that our review of issue closure was based on the artefacts that supported the closure at the time, rather than present day interviews with those involved in historic closures.
- ▶ **Assessment of the remedial actions from the trade outage Independent Expert review recommendations.** Evaluate the status on the implementation of any remedial actions from the trade outage Independent Expert review recommendations which are relevant to the CHES Replacement Program.
- ▶ **Go/No go criteria definition and reporting.** Assess the process undertaken to support the go/ no go decision during key project milestones focusing on the definition and reporting of the achievement of each entry criterion.

## 2.3 Approach

In undertaking our assessment for the delivery of this report, the following activities were performed:

1. *Documentation review:* A detailed review and analysis of ASX's Assurance Program and related relevant artefacts including those associated to the CHES Replacement Program. All documentation



was provided to EY by ASX based on a documentation request. A list of documentation reviewed can be found in Appendix D.

2. *Assurance Program Governance meetings:* Meetings were held to understand the status and process of closure of the findings from the completed assurance activities including on-going governance and change management activities in relation to the Assurance Program.
3. *Interviews with key stakeholders:* The review also involved stakeholder interviews to capture additional input to complement the analysis of the documentation provided and inform our understanding. Key business stakeholders were asked about their role with respect to the project and the Assurance Program including the coverage of key project risks. In addition, interviews with assurance providers were held to discuss the scope, approach, and outcome of the assurance reviews conducted. A list of interviews conducted with key stakeholders can be found in Appendix C.
4. *Assurance Program progress assessment:* Our evaluation of the progress of the Assurance Program included an assessment of the amendments to the areas in scope for review to determine the alignment with any changes coming from the CHES Replacement Project timelines and new key risks identified in the project RAID.

## 2.4 Limitations

We draw your attention to the limitations inherent in this report:

- ▶ Our work was not performed in accordance with generally accepted auditing, review, or other assurance standards in Australia and accordingly does not express any form of assurance. This report does not constitute legal opinion or advice. We have not conducted a review to detect fraud or illegal acts.
- ▶ Our work does not assume any responsibility for any third-party products, programs or services, their performance or compliance with your specifications or otherwise.

- ▶ Our work did not intend to identify, address, or correct any errors or defects in your computer systems, other devices, or components thereof (“Systems”), whether or not due to imprecise or ambiguous entry, storage, interpretation, or processing or reporting of data. We are not responsible for any defect or problem arising out of or related to data processing in any Systems in relation to the CHES Replacement Program and its Assurance Program.
- ▶ Our review of the closure of the remedial actions associated with the completed assurance reviews was limited to assess the due diligence of the process undertaken through the review of the documentation provided by ASX as documented evidence to support the closure. Professional scepticism required that our review of issue closure was based on the artefacts that supported the closure at the time, rather than present day interviews with those involved in historic closures. We did not evaluate the operational implementation and adequacy of the remedial actions.
- ▶ Our review was limited to documents requested by EY and provided by ASX as deemed relevant in line with the agreed scope and EY requests, with the expectation that ASX had those artefacts documented to satisfy its own governance arrangements and executive accountability needs.
- ▶ Our scope under the licence conditions requires us to oversee the implementation of any remedial actions from the trade outage Independent Expert review recommendations which are relevant to the CHES Replacement Program. For the purpose of our engagement, we define oversee as to observe, inspect and test that ASX has implemented the remedial actions. ASX are accountable and responsible for the implementation activities and EY will not act as management or direct the implementation.

## 2.5 Use and disclosure of our reports

We are providing specific advice only for this engagement and for no other purpose and we disclaim any responsibility for the use of our

advice for a different purpose or in a different context. If you plan to use this advice on another transaction or in another context, please let us know and provide us with all material information so that we can provide advice tailored to the appropriate circumstances.

Our Reports (including the EY Summary Reports) may be relied upon by ASX and ASX's regulators ASIC and the RBA for the purpose outlined in this SOW only. We understand that ASIC and the RBA, and ASX may issue a media release and/or a public report referring to or publishing the content of our Reports, and may make or issue our Reports or a summary of the content of our Reports. We will prepare a summary of our Reports (EY Summary Reports). We consent to ASIC and the RBA, and ASX publishing our Reports, EY Summary Reports and/or summaries of our Reports.

For the avoidance of doubt, no other party other than ASX, ASIC and the RBA may rely on the Reports. We disclaim all responsibility to any such other party for any loss or liability that the other party may suffer or incur arising from or relating to or in any way connected with the contents of our Reports, the provision of our Reports to the other party or the reliance upon our report by the other party.

### 3. Findings and Recommendations

Detailed below are the findings and recommendations from our 30 June 2022 Progress Report which includes our review and update on the Design Report and status update of existing remedial actions from the completed Assurance Reviews, and the assessment of remedial actions from the trade outage Independent Expert review recommendations.

We also assessed the amendments made to the Assurance Program in response to changes to the project timelines, approach, and milestones.

#### 3.1 Design Assessment Update

The objective of this area is to evaluate the status of the remediation actions associated with the findings raised in the Design Report and the continued effectiveness of the change management and governance process of the Assurance Program.

##### Context

ASX has developed an Assurance Program to assist with ensuring the project meets its objective of the successful replacement of CHES with a system based on DLT that meets ASX's functional & non-functional requirements and to provide confidence to internal and external stakeholders, supporting decision-making for key project milestones including go-live readiness.

Our Design Report published on 28 February 2022 included findings associated with the nature and extent of assurance activities and around the Assurance Program governance and change management.

The findings and the updates are included in the following table:

Finding Title	Remediation Status
Indicative Scope Details	<p><b>Closed</b></p> <p>For each of the reviews planned in the Assurance Program, we have observed that ASX has outlined the indicative scope to meet the objective of the assurance activity including the related project milestone, responsible executive, and expected assurance provider.</p>
Milestone Readiness	<p><b>Closed</b></p> <p>We have observed that the following remedial actions were performed:</p> <ul style="list-style-type: none"> <li>▶ ASX has implemented the suggested recommendations to provide improved assurance over key project milestones. As part of the ITE2 onboarding milestone, a roll-up assessment was performed over the open findings from the completed assurance activities to determine the impact to the go-live decision. The outcome of this assessment was presented to the Executive Steering Group (ESG) during the Go/No Go decision meeting on 21 April 2022.</li> <li>▶ ASX has adjusted the timing of the planned technology and operational controls reviews to align to key project milestones (i.e., ITE 2 operational readiness, pre go-live, and post go-live). In addition, organisational change management has been incorporated into the indicative scope for the planned Customer Readiness assurance review.</li> </ul>

Finding Title	Remediation Status
Assurance Program governance and change management	<p><b>Closed</b></p> <p>ASX has improved the process in governing and managing the assurance program. The improvements implemented include formalising the periodic Assurance Program governance meetings whereby agenda and agreed actions and decisions are formally documented. Furthermore, the progress of the Assurance Program activities, status of remedial actions and upcoming assurance reviews were presented during the ESG meetings.</p> <p>The remediation action associated with formalising the articulation of the expectations of service providers including their independence has been completed [REDACTED].</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED] We are satisfied that this addresses our design recommendation. There were no new SoWs signed in this period and so we will test the operational in-use effectiveness in our next report.</p> <p>We found that the governance process over the Assurance Program should be improved in relation to the tracking and monitoring of finding raised and the process of closure of the remediation actions as a result of the completed assurance reviews.</p>

Finding Title	Remediation Status
	Refer to 3.2 and 3.3. for the details of the observations and recommendations of our assessment of ASX’s remedial actions coming out of completed assurance reviews.

As the CHES Replacement Project is going through re-planning activities due to the changes in the go-live and ITE2 onboarding activities, the Assurance Program was adjusted to align with these changes whereby a review over the replanning activities has been introduced. In addition, through the periodic Assurance Program governance forum, and additional assurance review over Incident Playbooks is currently being considered.

We have continued to assess the scope and depth of the Assurance program against project risks, EY program assurance methodology, and key project enablers and did not identify key areas that were not covered. This assessment is based on the current status of the Project. We will continue to evaluate this as part of future six monthly progress reports as the Project evolves.

Refer to Appendix A for the latest status of the Assurance Program.

### 3.2 Assessment of the findings from the completed assurance reviews

The objective of this area is to evaluate the status of the implementation of remedial actions and assess the adequacy of the validation process undertaken over the closure of the remedial actions arising from completed reviews.

#### Context

The Assurance Program is aligned to the key project milestones and, in response to the latest changes to the project timelines, the Assurance

Program has also been updated whereby revised dates for specific reviews and inclusion of additional reviews were added to provide the right level of assurance through the project lifecycle.

Multiple reviews are conducted within the Assurance Program and the assurance providers produce a final report which outlines the findings and recommendations for each reviewed domain. The project team evaluates the suggested recommendations, and a management response is produced, outlining the management actions that will be implemented as remediation.

The current process defines the PMO as the responsible for the overall monitoring of the status of the remediation actions coming from assurance reviews conducted within the Assurance Program. Remediation actions from previous reviews around Project Governance were monitored by the Internal Audit Team and defects/bugs identified through technical reviews (security and identity access management) are monitored separately by specific teams that have the technical expertise to assess the closure of defects.

To monitor the status of remediation activities, the PMO engages with the different teams and issue owners to assess the closure of findings raised as part of different reviews conducted by the assurance providers. The relevant artefacts are attached to internal tracking tools within JIRA/Confluence and the findings are closed as appropriate.

The table below represents the status of existing remedial actions from the completed Assurance Reviews tracked by the PMO as of 10th May 2022. Refer to Appendix B for the detailed table outlining the status per assurance review.

Reviews completed as of 10 <sup>th</sup> May 2022	13/44
Total findings to date <sup>1</sup>	142
Findings closed to date	119
Findings still open	23
Overdue Items <sup>2</sup>	6
Overdue Items Closed	0
Findings due to be closed over next month	3
Findings due to be closed between 1 and 3 months	11
Findings due to be closed between 3 and 6 months	2
Findings due to be closed in > 6 months	7

<sup>1</sup> The total number of findings to date does not include the ones raised as defects. The defects are tracked by specific teams who have technical expertise to assess closure.

<sup>2</sup> Due dates for 6 remediation activities have been extended and they are tracked as Overdue Items by the PMO. Overdue items are also considered in the categories below.

## Findings

We have independently assessed the process for the closure of management actions linked to the completed assurance activities through the review of relevant artefacts provided by ASX and workshops conducted with the assurance providers and the project team. The project team closed 119 findings to date, including 51 from their Trade Outage Self-Assessment review. From the remaining 68 findings, we assessed the relevant artefacts and found that the closure process should be improved for 7 of them. The following findings should be addressed by ASX in the process of assessing remedial actions:

### ► Closure process and documentation for closed findings

Through inspection of the artefacts provided in relation to closed findings from completed assurance reviews, we noted that ASX should increase the due diligence when assessing the evidence provided by the issue owner prior to considering the management action to be fully closed. For example:

- ▶ A formal document that should have been signed-off prior to confirming issue remediation was not fully signed-off after the issue was closed in JIRA. The related sign-offs were subsequently completed by ASX.
- ▶ Management actions have been established and due dates have been assigned following the proposed actions suggested by an assurance provider. However, the management actions defined by ASX do not consider all aspects raised in the original report to fully mitigate the issue and as a result, a number of sub-actions have not been appropriately tracked for resolution.
- ▶ At the time of report issuance, management considered a number of actions to be already closed, pointing to ongoing or future activities that would address the related finding. In these instances, such remedial actions were not included in the list of remedial actions to be tracked by PMO.
- ▶ Through inspection of another Independent Expert report, 3 out of 59 recommendations were identified as out of scope for being "Not Ready", which means the project was not at the stage to address the suggested recommendation. However, we noted that those recommendations were not being tracked to be actioned when the project achieved the target milestone, which poses a risk of relevant recommendations not being tracked and implemented over the project lifecycle. ASX has since captured these 3 items in JIRA.
- ▶ In relation to the closure process, it is not clear the extent of approvals needed to consider an action fully closed and whether the assurance providers participate in discussions to provide their views around the closure of findings.

**We recommend (Recommendation 1.a)** that the Assurance Program improve the process around closure of findings, detailing the necessary approvals for a finding to be considered fully closed and increasing the due diligence when assessing the evidence

provided by the issue owner prior to considering the management action to be fully closed.

In the specific scenario that a recommendation is not ready to be actioned because the project is not at the stage of implementing such recommendation, the PMO should consider an appropriate due date in line with the target milestone. This will allow full visibility over past recommendations and ensure all suggested actions are implemented following the appropriate timeframe in the project lifecycle.

The Assurance Program should also, where possible, involve the Assurance providers responsible for the recommendations raised to provide their views as appropriate prior to considering a finding to be closed.

Given the historic nature of these assurance activities, whereby the related findings have been superseded by other activities within the Assurance Program, we do not recommend revisiting the activities or evidence to support the closure decisions.

#### ▶ **Consistency of risk ratings from reviews**

The project team utilised the ASX project risk scaler, based on impact and likelihood to guide the risk rating definition for the various findings within the Assurance Program.

Our review found instances of inconsistent application of the risk scale across the findings raised by specific reviews, factoring in the Risk Rating matrix. For example:

- ▶ An independent review around Data Migration did not have ratings associated to the findings, but the project team assessed all the findings to be medium without providing the detailed rationale for the decision or evidence of a risk assessment exercise.

- ▶ Another independent review (Identity and Access Management) assessed the findings as “High priority quick wins”, “High Priority”, “Medium Priority” and “Low Priority”, which is not consistent with the Risk Rating Matrix utilised by the project.

**We recommend (Recommendation 1.b)** the Assurance Program to improve the risk assessment process with an objective of improving analysis of the potential impact, working together with assurance providers and issue owners to ensure the risk ratings are appropriate and consistently applied across all the Assurance Program reviews. The risk assessment should apply the appropriate ASX Risk Rating matrices and involve issue owners and assurance providers, as appropriate. In the event that the Risk Rating matrix utilised by the project cannot be applied to the specific reviews, the risk assessment should capture how the risk scalars from the reviews were translated to the matrix utilised by the project.

- ▶ **Remedial actions managed by other teams and other projects**

Findings around Security Test and Identity Access Management are being raised as defects and tracked by the specific teams / projects, limiting PMO’s visibility over remedial actions and timelines.

Currently, there is no centralised view around specific findings related to those domains, which contributes to the lack of consistency and potential delays addressing issues related to those domains, which are critical to the success of the CHES replacement project.

**We recommend (Recommendation 1.c)** that findings that are being raised as defects and tracked by other teams / projects are periodically reported to the Assurance Program to ensure they are appropriately and centralised tracked.

The periodic reporting of defects should include the status of remedial actions and provide clarity over timelines and any roadblocks, allowing the Assurance Program to have full visibility over the ongoing activities. In addition, validation activities over the closure of the defects should be established.

The recommendations outlined here in section 3.2 have been summarised as **Recommendation 1** in the executive summary.

### **3.3 Assessment of the remedial actions from the trade outage Independent Expert review recommendations**

The objective of this area is to evaluate the status on the implementation of any remedial actions from the trade outage Independent Expert review recommendations which are relevant to the CHES Replacement Program

#### **Context**

In November 2020, ASX released a refreshed version of the Trade platform and the release of the new platform resulted in a market outage.

ASX hired an Independent Expert to provide an independent review of the conduct and performance of the ASX Trade Refresh Project. The Independent Expert produced a report in June 2021, which provided 59 specific recommendations for improvement.



As part of the reviews included in the Assurance Program, ASX then engaged an Assurance Provider to provide an opinion on how well the CHES program had implemented each of the 59 recommendations.

As a result of this review, the assurance provider raised 18 Medium Risk findings for management attention in relation to the Independent Expert recommendations that were in scope and not addressed yet by ASX for the CHES Replacement Project. ASX defined 17 actions to remediate these findings (one of the actions addresses two findings simultaneously).

Currently, 8 actions have been closed and 9 are due to be implemented over the following months. We noted that 3 actions were not initially tracked by PMO as they were assessed as “Not Ready” at the time the report by the assurance provider was issued. Subsequently, these 3 actions were recently included in the list of remediation actions being tracked and monitored by PMO. We will assess the closure of these actions in our next six-monthly progress report.

Evidence supporting the closure of the 8 actions closed has been assessed as part of the work described in section 3.2 Assessment of the findings from the completed assurance reviews. We acknowledge that the recommendation to improve the tracking of findings, the closure process and extent of documentation associated to closed actions outlined in section 3.2 apply to the remedial actions of this section.

### 3.4 Go/No go criteria definition and reporting

The objective of this area is to assess the process undertaken to support the go/ no go decision during key project milestones focusing on the definition and reporting of the achievement of each entry criterion.

#### Context

The definition and achievement of the go/no go criteria were presented and captured within the ESG meeting deck and minutes for ITE2 onboarding. These documents include details on the status of each of the

criteria and demonstrate appropriate challenge and governance around the decision.

#### Findings

Our assessment found that that definition and reporting of the achievement of each of the criteria should be improved:

- ▶ 1 out of the 9 criteria established did not use defined ASX terms and so was open to interpretation. For this technical decision criteria, the materials did not define with clarity what is considered as ‘sufficient controls’ and the tolerance of acceptable defects as a result of the testing.
- ▶ There is no clear consolidated view in the meeting deck with the go/no go conclusion for every entry criterion provided by the accountable executives to help support the final decision.

These findings, while important, are not material to the overall go / no go decision for ITE2 onboarding and we do not question the decision taken.

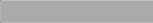






**We recommend (Recommendation 2)** management to improve the decision-making support process by:

- ▶ Enhancing the precision of the criteria. In this case, this relates to one technical criterion, and for future decision points, any new criteria defined should clearly outline the acceptable threshold including a clear view of accountability for the evaluation of each of the criteria.
- ▶ Enhancing the presentation of final conclusions for each criterion measured in support of the final go / no go decision. For the avoidance of doubt, the final conclusion go / no go should be presented in a clear manner demonstrating whether the established criteria have been met or not by the accountable executives, showing in comparison the threshold and the current value/status as an outcome of the assessments performed.



We will be assessing the completeness and appropriateness of the acceptance criteria established for future milestones and will include our conclusion in the next six-monthly progress report.

## Appendix A ASX Assurance Program summary

Review*	Project Accountable Party*	Indicative Scope & Timetable*	Assurance Provider*	Status / Progress Update*
<b>Project Governance</b>				
Project Health Check		Roles and responsibilities, reporting framework, RAID management, cost management, stakeholder engagement, schedule management [Nov 2019]	3rd-party A	Complete
Project Replan		Process Review, Assumption Review, Challenge Process, Contingency Planning [Sept 2020]	3rd-party A	Complete
Project Health Check		Roles and responsibilities, reporting framework, RAID management, cost management, stakeholder engagement, schedule management [May 2021]	3rd-party A	Complete
Trade outage independent expert review Recommendations Self Assessment		Assess the program against the 59 recommendations from the trade outage independent expert Review [Oct 2021]	Project Team	Complete
Trade outage independent expert Review Recommendations		Assess the program against the 59 recommendations from the trade outage independent expert Review [Dec 2021]	3rd-party A	Complete
Project Health Check		Scope limited to the following program domains: Program Governance, Planning Management, Scope Management (including Change Control), Risks, Assumptions, Issues and Dependencies (RAID) Management, Supplier Management and Quality Management [May 2022]	3rd-party A	In progress
Post Implementation Review		The PIR provides an opportunity for those involved in the project to reflect upon it from start to finish. This is done in order to determine what went well, what could have been improved and what actions they would recommend for future [Date TBC]	Project Delivery	Not Started

Review*	Project Accountable Party*	Indicative Scope & Timetable*	Assurance Provider*	Status / Progress Update*
<b>Assurance Program Design / New Licence Conditions</b>				
Assurance Program Design		Report on the design of the Assurance Program [Feb 2022]	3rd-party A	Complete
Assurance Program Design Update		Update on design of Assurance Program; remedial action update (including trade outage independent expert review recommendation actions) [Jun 2022]	3rd-party A	In progress
Assurance Program Design Update		Update on design of Assurance Program; remedial action update (including trade outage independent expert review recommendation actions) [Dec 2022]	3rd-party A	Not Started
Go Live Governance Readiness		Assess that the Assurance Program has met its objectives; adequacy of Testing Framework; adequacy of Go Live Decision Framework [Mar 2023]	3rd-party A	Not Started
Post Implementation Review Report		Assess that the Assurance Program has met its objectives; adequacy of testing framework; adequacy of Go Live Decision Framework [6 + 12 months post go live]	3rd-party A	Not Started
<b>Technical Solution and Design</b>				
Testing Approach Review		Adequacy of test approach [Apr 2021]	3rd-party B (embedded)	Complete
Performance Review		Review of (a) the ASX performance design and testing strategy, (b) scalability design and testing strategy and (c) the performance / scalability test results achieved from the production release candidate solution to key ASX requirements [Date TBC]	3rd-party B (embedded)	Not Started
Scalability Review		Review of (a) the ASX performance design and testing strategy, (b) scalability design and testing strategy and (c) the performance / scalability test results achieved from the production release candidate solution to key ASX requirements [Date TBC]	3rd-party B (embedded)	Not Started

Review*	Project Accountable Party*	Indicative Scope & Timetable*	Assurance Provider*	Status / Progress Update*
Test Approach / Strategy Review		Review of the ASX test strategy and the ASX industry test strategy for the project, contrasting against the leading test practice for a technology change project for an enterprise-scale / national infrastructure [Date TBC]	3rd-party B	Not Started
<b>Technical Solution and Design - Security Design</b>				
Security Design Review		Security review of the DLT platform and CHES+ application covering security design and threat risk assessment, ongoing component testing as security functionality is delivered, environment reviews pre go live for ITE and Prod environments and penetration testing pre go live (and potentially at ITE).  Pre ITE1 - Interim Report - Findings from a design review (gaps). Security design and architecture, security NFR testing [May 2021]	3rd-party C (embedded)	Complete
Security Test		Ongoing component testing as security functionality is delivered, environment reviews pre go live for ITE1 and penetration testing pre go live for ITE1 Pre ITE1 Security NFR testing [Oct 2021]	3rd-party C (embedded)	Complete
Security Assurance Review (ITE2)		Component coverage - all channels + infrastructure + CSAM/CIAM (CHES+ exposed functionality only) [Date TBC]	3rd-party C (embedded)	In Progress
[NEW] Security Assurance Review (Prod - White box)		Testing scope will be defined by the security requirements as captured in ASX NFRs, Vendor NFRs, Claims and ASVS. Assessment will be conducted on relevant components of the go-live versions of platform, CHES+ application, channels and infrastructure [Date TBC]	3rd-party C (embedded)	Not Started

Review*	Project Accountable Party*	Indicative Scope & Timetable*	Assurance Provider*	Status / Progress Update*
[NEW] Security Assurance Review (Prod - Black box)	[REDACTED]	Testing scope will be CHES Replacement Solution and the operating environment as exposed to anticipated threat actors such as cyber adversary on the internet, malicious insider, etc. [Date TBC]	3rd-party C	Not Started
[NEW] Security Design Review	[REDACTED]	The CHES+ solution is defined by the security requirements, any component within the CHES+ solution that is touched by these requirements become in scope for this assessment [Date TBC]	3rd-party C (embedded)	In Progress
[NEW] Security assurance review (ITE-M)	[REDACTED]	Predominantly 'grey box' penetration testing on security controls associated with ITE-M go live [Date TBC]	3rd-party C (embedded)	Not Started
[NEW] Security Assurance Review (MDRO)	[REDACTED]	Combination of 'white box' penetration testing on security controls associated with Prod target state security controls (as per "Security Assurance Review (Prod- White Box) and 'grey box' penetration testing of security controls in the environment (similar to ITE2 security assurance review) [Date TBC]	3rd-party C (embedded)	Not Started
<b>Operational Process and Control Design and Implementation</b>				
Identity and Access Management	[REDACTED]	Identity and Access Management system (3rd-party D) configuration and setup health check [Sep 2021]	3rd-party D (embedded)	Complete
Identity and Access Management (CSAM Prod)	[REDACTED]	Penetration Test, Application Hardening Assessment, Web Application Assessment [Date TBC]	3rd-party B	In progress
Technology Controls Review	[REDACTED]	Review of the design of supporting processes for ITE1 including: <ul style="list-style-type: none"> <li>▶ software vendor on-boarding process</li> <li>▶ identity access management (IAM) process for internal and external users</li> <li>▶ defect management process, and</li> </ul>	Internal Audit	Complete

Review*	Project Accountable Party*	Indicative Scope & Timetable*	Assurance Provider*	Status / Progress Update*
		<ul style="list-style-type: none"> <li>monitoring of system performance and stability including any related vendor requirements.</li> </ul> [Nov 2021]		
Technology Controls Review		Op. Readiness - Assess the adequacy of the design and use of key process and controls in ITE2, supporting both operational and technology areas [Date TBC]	Internal Audit	Not Started
Technology Controls Review		Pre GO-LIVE - Assess the adequacy of the design and operational effectiveness of key process and controls, supporting both operational and technology areas [Date TBC]	Internal Audit	Not Started
Technology Controls Review		Post GO-LIVE - assess the production operational effectiveness of key process and controls, supporting both operational and technology areas [Date TBC]	Internal Audit	Not Started
Operational Controls Review		Review of the design of supporting processes for ITE1 including: <ul style="list-style-type: none"> <li>software vendor on-boarding process</li> <li>identity access management (IAM) process for internal and external users</li> <li>defect management process, and</li> <li>monitoring of system performance and stability including any related vendor requirements.</li> </ul> [Nov 2021]	Internal Audit	Complete
Operational Controls Review		Op. Readiness - Assess the adequacy of the design and use of key process and controls in ITE2, supporting both operational and technology areas [Date TBC]	Internal Audit	Not Started
Operational Controls Review		Pre GO-LIVE - Assess the adequacy of the design and operational effectiveness of key process and controls, supporting both operational and technology areas [Date TBC]	Internal Audit	Not Started
Operational Controls Review		Post GO-LIVE - assess the production operational effectiveness of key process and controls, supporting both operational and technology areas [Date TBC]	Internal Audit	Not Started

Review*	Project Accountable Party*	Indicative Scope & Timetable*	Assurance Provider*	Status / Progress Update*
Operational Controls Review - Clearing Risk / Billing / Participant Compliance	[Redacted]	Op. Readiness - Assess the adequacy of the design and use of key process and controls in ITE2, supporting both operational and technology areas [Date TBC]	Internal Audit	Not Started
Operational Controls Review - Clearing Risk / Billing / Participant Compliance	[Redacted]	Pre GO-LIVE - Assess the adequacy of the design and operational effectiveness of key process and controls, supporting both operational and technology areas [Date TBC]	Internal Audit	Not Started
Operational Controls Review - Clearing Risk / Billing / Participant Compliance	[Redacted]	Post GO-LIVE - assess the production operational effectiveness of key process and controls, supporting both operational and technology areas [Date TBC]	Internal Audit	Not Started
Technology and Operation Controls Review - 3rd-party E	[Redacted]	Technology and Operation Controls Review [Date TBC]	Internal Audit/3rd-party E	Not Started
Post Go Live ASAE 3402 Controls Reports	[Redacted]	The processes below are covered by the current ASAE 3402 reports: Operations: Daily settlement, Securities holdings, ASXS initiated transactions Technology: Logical Access, Change Management, Physical security, Disaster recovery, IT operations and Environmental controls [Date TBC]	Internal Audit/3rd-party E	Not Started
Technology and Operations Controls Review	[Redacted]	Pre GO-LIVE Technology and Operations Controls Review [Date TBC]	Internal Audit/3rd-party E	Not Started
Technology and Operations Controls Review	[Redacted]	Post GO-LIVE Technology and Operation Controls Review [Date TBC]	Internal Audit/3rd-party E	Not Started
<b>Industry Readiness and Implementation</b>				

Review*	Project Accountable Party*	Indicative Scope & Timetable*	Assurance Provider*	Status / Progress Update*
Data Migration Review	[REDACTED]	Independent assessment of the accuracy and completeness of the data migration from old to new CHES. Assessment of outcomes of various dress rehearsals ahead of go-live and migrated data post go live. Review Strategy [Dec 2021]	3rd-party A	Complete
Data Migration Review	[REDACTED]	Market Dress Rehearsal Readiness Assessment [Date TBC]	3rd-party A	Not Started
Customer Readiness Review	[REDACTED]	Assurance that * ASX is ready for the cutover * Customers and vendors are ready for the cutover - setup, accreditation and attestation [Date TBC]	TBC	Not Started



## Appendix B Tracking of Assurance reviews by PMO

Ref	Review (responsible executive initials)	Comp. Date	Total findings	Closed findings	Open findings	Closure due next month (May)	Closure due 1 to 3 month (Jun to Aug)	Closure due 3 to 6 months (Sep to Nov)	Closure due > 6 months (Dec on)
1	Project health check	Nov-19	27	21	6	-	-	-	6
2	Project Replan	Sep-20	6	6	0	-	-	-	-
3	Project health check	May-21	7	7	0	-	-	-	-
4	Trade Outage Review Recommendations - Self Assessment	Oct-21	51	51	0	-	-	-	-
5	Trade Outage Review Recommendations - Independent Assessment	Dec-21	17	8	9	2	5	2	-
8	Assurance Program Design	Feb-22	3	3	0	-	-	-	-
13	Testing approach review (1)	Apr-21	NA	NA	NA	-	-	-	-
17	Security design review	May-21	3	0	3	-	2	-	1
18	Security Test (2)	Oct-21	NA	NA	NA	-	-	-	-
21	Identity and Access Management (3)	Sep-21	NA	NA	NA	-	-	-	-
23	Technology controls review	Sep-21	19	19	0	-	-	-	-
27	Operations controls review	Sep-21	inc above	inc above	inc above	inc above	inc above	inc above	inc above
38	Data Migration Review	Dec-21	9	5	4	-	4	-	-
	<b>Total</b>		<b>142</b>	<b>119</b>	<b>23</b>	<b>3</b>	<b>11</b>	<b>2</b>	<b>7</b>

(1) This was not a formal review but involved third-party resources working with ASX to advise and update the test approach.

(2) Findings identified and raised as defects are being tracked as such.

(3) Findings identified and raised as defects are being tracked via CIAM / CSAM project as such

## Appendix C Interview list

The below table outline the interviews conducted with ASX stakeholders:

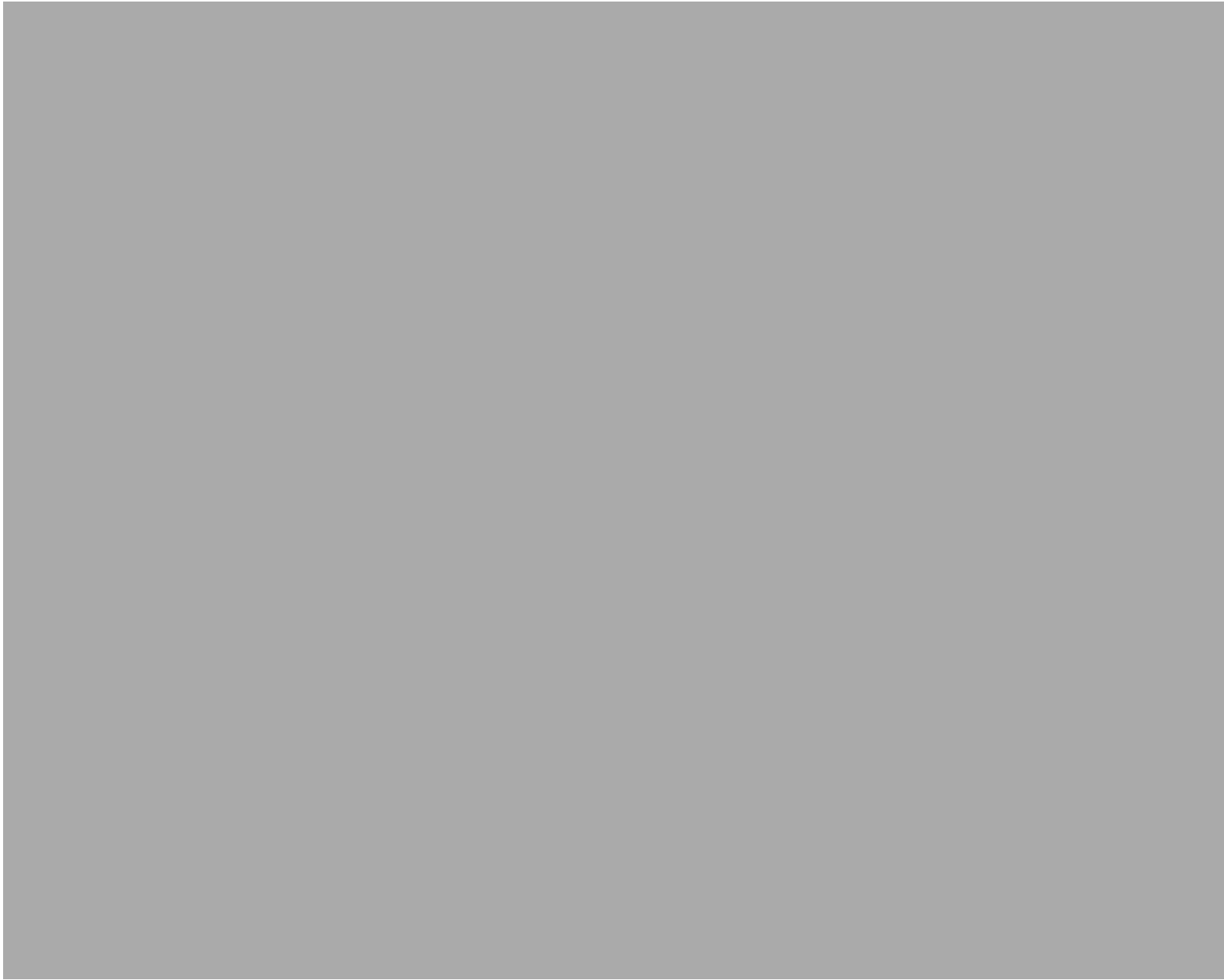
Interview list	
Role	Date of interview
Chief Risk Officer	08 March 2022; 12 May 2022
Delivery Manager Implementation Readiness	08 March 2022
End to End Delivery Manager	08 March 2022; 12 May 2022; 16 May 2022; 23 May 2022; 25 May 2022
Project Management Office	08 March 2022; 12 May 2022; 16 May 2022; 23 May 2022; 25 May 2022
General Manager, Internal Audit	15 March 2022
Project/Business Owner	08 March 22; 11 May 2022
Business Regulatory Owner	16 May 2022
Technology Owner (CTO)	16 May 2022
Delivery Manager Implementation Readiness	17 May 2022
Interview with 3 <sup>rd</sup> -party A to discuss completed reviews	19 May 2022
Interview with 3 <sup>rd</sup> -party C to discuss completed reviews	23 May 2022
Interview with 3 <sup>rd</sup> -party D to discuss completed reviews	25 May 2022
Group Executive, Securities and Payments	27 May 2022

## Appendix D Documents reviewed



















## Appendix E Release Notice

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