



ASAE 3402

Assurance Report on Controls at a Service Organisation relating to the Clearing House Electronic Subregister System (CHESS)

1 JULY 2020 – 30 JUNE 2021



Contents

1.	Assertion by Management	3
2.	Independent Assurance Report	5
3.	Introduction	8
4.	Overview of the ASX Group	9
5.	Overall Control Environment	10
6.	Overview of CHES	12
7.	Use and Scope of the Report	15
8.	Control Objectives and Related Control Procedures	17



01 / Statement by ASX as the Service Organisation

The information provided by ASX management in this report has been prepared for facility users who have used CHES (Facility Users) and their auditors who have a sufficient understanding to consider the description, along with other information (including information about controls operated by Facility Users themselves), when assessing the risks of material misstatement of Facility User's financial reports / statements. ASX confirms:

- (a) The accompanying description in Sections 5, 6 and 8 fairly presents CHES for processing Facility User's transactions throughout the period 1 July 2020 to 30 June 2021.

The criteria used in making this statement were that the accompanying description:

- (i) presents how the system was designed and implemented, including:
 - the types of services provided including, as appropriate, classes of transactions processed
 - the procedures, within both information technology and manual systems, by which those transactions were initiated, recorded, processed, corrected as necessary, and transferred to the reports prepared for Facility Users
 - the related accounting records, supporting information and specific accounts that were used to initiate, record, process and report transactions; this includes the correction of incorrect information and how information was transferred to the reports prepared for Facility Users
 - how the system dealt with significant events and conditions, other than transactions
 - the process used to prepare reports for Facility Users
 - relevant control objectives and controls designed to achieve those objectives
 - controls that ASX assumed, in the design of the system, would be implemented by Facility Users, and which, if necessary to achieve control objectives stated in the accompanying description, are identified in the description along with the specific control objectives that cannot be achieved by ASX alone, and
 - other aspects of the ASX control environment, risk assessment process, information system (including the related business processes) and communication, control activities and monitoring controls that were relevant to processing and reporting Facility User's transactions.
 - (ii) includes relevant details of changes to CHES during the period 1 July 2020 to 30 June 2021, and
 - (iii) does not omit or distort information relevant to the scope of the system being described, while acknowledging that the description is prepared to meet the common needs of a broad range of Facility Users and their auditors and may not, therefore, include every aspect of the system that each individual Facility User may consider important in its own particular environment.
- (b) The controls related to the control objectives stated in the accompanying description were suitably designed and operated effectively throughout the period 1 July 2020 to 30 June 2021. The criteria used in making this statement were that:
- (i) the risks that threatened achievement of the control objectives stated in the description were identified
 - (ii) the identified controls would, if operated as described, provide reasonable assurance that those risks did not prevent the stated control objectives from being achieved, and



- (iii) the controls were consistently applied as designed, including that manual controls were applied by individuals who have the appropriate competence and authority, throughout the period 1 July 2020 to 30 June 2021.
- (c) In response to the COVID-19 pandemic and in accordance with Government and other expert advice, ASX transitioned to a hybrid operating model with the majority of personnel working remotely full or part time, including some responsible for transaction processing and operational support of CHESS. There has been no material change to the control environment, including the design and operating effectiveness of the controls listed in section 8 of this report, as a result of this change.

Signed on behalf of management

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Val Mathews

Chief Customer and Operating Officer

27 July 2021



02 / Independent Service Auditor's assurance report on the description of controls, their design and operating effectiveness

To: Directors of ASX Limited (ASX)

Scope

In accordance with the terms of the engagement letter dated 17 December 2020, we were engaged to report on ASX Limited's description in Sections 5, 6 and 8 of its CHESS system (System) for processing Facility User's transactions throughout the period 1 July 2020 to 30 June 2021 (the description), and on the design and operation of controls related to the control objectives stated in the description.

The description indicates that certain control objectives specified in the description can be achieved only if complementary user entity controls contemplated in the design of ASX's controls are suitably designed and operating effectively, along with related controls at the service organisation. We have not evaluated the suitability of the design or operating effectiveness of such complementary user entity controls.

ASX's Responsibilities

ASX is responsible for preparing the description and accompanying statement in Section 1, including the completeness, accuracy and method of presentation of the description and statement; providing the services covered by the description; stating the control objectives; and designing, implementing and effectively operating controls to achieve the stated control objectives.

Our Independence and Quality Control

We have complied with relevant ethical requirements related to assurance engagements, which are founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.

The firm applies Auditing Standard ASQC 1 *Quality Control for Firms that Perform Audits and Reviews of Financial Reports and Other Financial Information, Other Assurance Engagements and Related Services Engagements* and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Service Auditor's Responsibilities

Our responsibility is to express an opinion on ASX's description and on the design and operation of controls related to the control objectives stated in that description, based on our procedures. We conducted our

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engagement in accordance with Standard on Assurance Engagements ASAE 3402 *Assurance Reports on Controls at a Service Organisation (ASAE 3402)*, issued by the Auditing and Assurance Standards Board. That standard requires that we plan and perform our procedures to obtain reasonable assurance about whether, in all material respects, the description is fairly presented and the controls are suitably designed and operating effectively.

An assurance engagement to report on the description, design and operating effectiveness of controls at a service organisation involves performing procedures to obtain evidence about the disclosures in the service organisation's description of its System, and the design and operating effectiveness of controls. The procedures selected depend on our judgement, including the assessment of the risks that the description is not fairly presented, and that controls are not suitably designed or operating effectively. Our procedures included testing the operating effectiveness of those controls that we consider necessary to provide reasonable assurance that the control objectives stated in the description were achieved. An assurance engagement of this type also includes evaluating the overall presentation of the description, the suitability of the objectives stated therein, and the suitability of the criteria specified by the service organisation and described in Section 1.

We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Limitations of Controls at a Service Organisation

ASX's description is prepared to meet the common needs of a broad range of Facility Users and their auditors and may not, therefore, include every aspect of the System that each individual Facility User may consider important in its own particular environment. In addition to this, because of their nature, controls at a service organisation may not prevent or detect all errors or omissions in processing or reporting transactions. Further, the projection of any evaluation of effectiveness to future periods is subject to the risk that controls at a service organisation may become inadequate or fail.

Emphasis of Matter

We draw attention to Control 4.2: 'The Disaster Recovery Plan for the System is tested on a regular basis' which supports Control Objective 4: 'Controls provide reasonable assurance that in the event of a disaster, measures are in place to enable CHESS to resume effective operations within two hours'. While a documented Disaster Recovery Plan is in place, a Disaster Recovery test was not performed during the period 1 July 2020 to 30 June 2021. The test was originally scheduled for April 2021. However, due to a hardware upgrade in May 2021, management assessed and approved a deferral of this test to July 2021.

The Disaster Recovery test has been completed successfully in July 2021. Our opinion is not modified in respect of this matter.

Opinion

Our opinion has been formed on the basis of the matters outlined in this report. The criteria we used in forming our opinion are those described in ASX's statement in Section 1. In our opinion, provided Facility Users have applied the complementary user entity controls contemplated in the design of ASX's System and those controls were operating effectively, in all material respects:

- (a) The description fairly presents the System as designed and implemented throughout the period from 1 July 2020 to 30 June 2021.
- (b) The controls related to the control objectives stated in the description were suitably designed throughout the period from 1 July 2020 to 30 June 2021.



- (c) The controls tested, which were those necessary to provide reasonable assurance that the control objectives stated in the description were achieved, operated effectively throughout the period from 1 July 2020 to 30 June 2021.

Description of Tests of Controls


The specific controls tested and the nature, timing and results of those tests are listed in Section 8.

Intended Users and Purpose of the report

This report and the description of tests of controls in Section 8 are intended only for Facility Users who have used ASX's System and their auditors, who have sufficient understanding to consider it, along with other information including information about controls operated by Facility Users themselves, when assessing the risks of material misstatements of Facility User's financial reports / statements.

This report is prepared only for the purpose set out above and we disclaim any liability in relation to our report or any assumption of responsibility for any reliance on our report to any person other than ASX, Facility Users who have used ASX's System and their auditors or for any purpose other than that for which it was prepared.

PricewaterhouseCoopers

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Corinne Best
Partner

Sydney
27 July 2021



03 / Introduction

ASX management is responsible for the design, implementation and maintenance of the internal control procedures and for the declarations and assertions in this report. In carrying out this responsibility, management has regard to the interests of Facility Users, the general effectiveness of the operation of CHESS and the overall stability of the Australian financial system.

This report has been prepared to provide:

- an overview of the ASX Group
- an overview of CHESS and its role in the clearing and settlement process
- a summary of ASX's corporate governance arrangements relating to the CHESS operating environment
- the control objectives and control procedures that underpin the CHESS control environment, and
- the independent auditor's report on the control objectives and procedures.

The report has been prepared in compliance with *ASAE 3402 Assurance Reports on Controls at a Service Organisation*.



04/ Overview of the ASX Group

ASX is an integrated exchange offering listings, trading, clearing, settlement, technical and information services, and other post-trade services. It operates markets for a wide range of asset classes including equities, fixed income, commodities and energy and is a top 10 global securities exchange by value and the largest interest rate derivatives market in Asia.

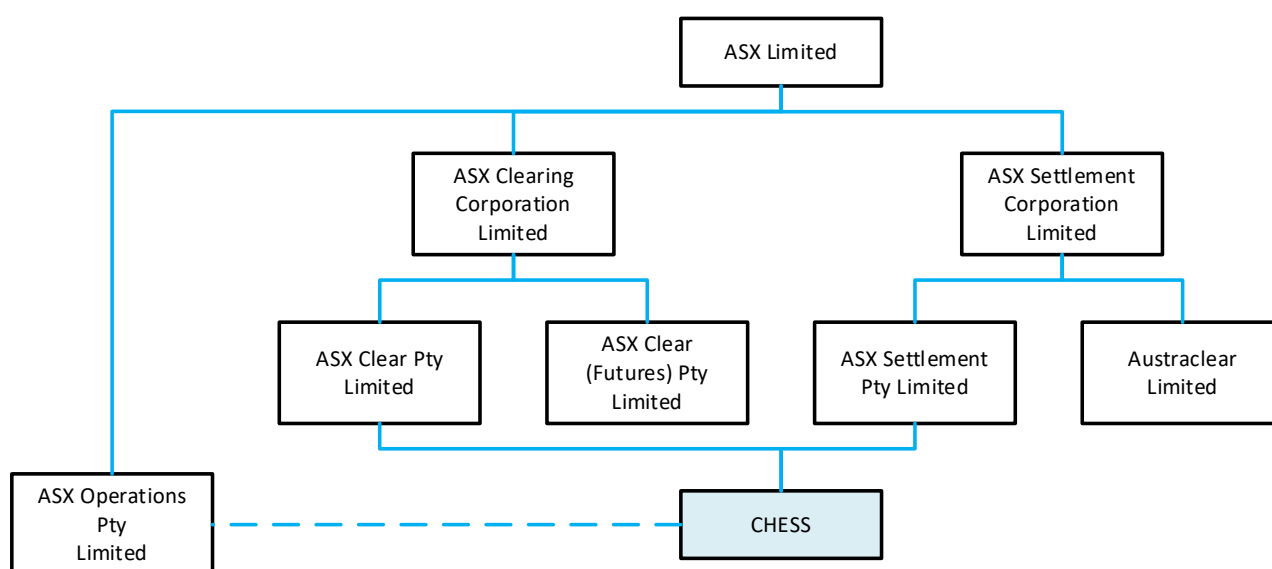
Companies, corporates and issuers of capital from Australia and around the world engage with ASX to manage risk and to raise capital to grow. ASX operates liquid, transparent and reliable markets of integrity. The certainty of its clearing and settlement activities help to underpin the systemic stability of the Australian economy.

ASX also provides data and technology services to intermediaries, banks, information vendors and software developers to help them make informed decisions, offer services to their clients and connect with one another.

More information about ASX can be found at: www2.asx.com.au.

Structure

Relevant parts of the ASX Group structure, including the responsibility for CHESS, are depicted below:





05 / Overall Control Environment

Corporate Governance

The control environment within which ASX operates CHESS is not restricted to the control objectives and procedures outlined in this report.

The ASX Group maintains a high standard of corporate governance and has implemented governance arrangements which are consistent with the ASX Corporate Governance Council's Corporate Governance Principles and Recommendations (4th Edition). An overview of those components of ASX's corporate governance framework which are relevant to the operation of CHESS is set out below. More information on ASX's corporate governance framework is available on ASX's website and in its Annual Report.

CHESS is operated by ASX Operations Pty Limited, a wholly-owned ASX Group subsidiary, to fulfil the clearing and settlement functions of ASX Clear Pty Limited and ASX Settlement Pty Limited respectively. ASX Clear and ASX Settlement are clearing and settlement facility licensees and are wholly-owned subsidiaries of ASX. They are two of four clearing and settlement facility licensees in the ASX Group.

The ASX Board relies on the Clearing and Settlement Boards to provide oversight of the clearing and settlement operations of the clearing and settlement subsidiaries including, the management of clearing and settlement risk, and compliance with the Financial Stability Standards determined by the Reserve Bank of Australia (RBA). The Clearing and Settlement Boards' Charter sets out further details regarding their functions and governance.

ASX Limited has established an Audit and Risk Committee (ARC) (comprising independent, non-executive directors of ASX Limited). The ARC also serves as the audit and risk committee of ASX's Clearing and Settlement Boards (including ASX Clear and ASX Settlement).

The following Committees (comprised of Senior Management) also form an integral part of the overall control environment in which CHESS operates:

- Risk Committee
- Regulatory Committee, and
- Technology, Operations and Security Committee.

The system of internal control and risk management is reviewed by Internal Audit. The General Manager Internal Audit reports to the Chair of ARC, and to the Chief Risk Officer for administrative purposes. The General Manager Internal Audit presents an Internal Audit Plan and quarterly audit findings to the ARC.

In addition, ASX's Enterprise Compliance function conducts oversight of the ASX Group and provides quarterly reports to the ARC on compliance with key licence obligations.

Charters of the ASX Board, Clearing and Settlement Boards, ARC and Internal Audit are available on ASX's website: www2.asx.com.au.

Regulatory Governance

Licensed entities in the ASX Group are subject to review by ASIC and the RBA.

Operational Governance

The primary divisions that have direct control over the operational governance of CHESS are Operations and Technology.

Operations is responsible for the day to day processing of trading, clearing and settlement transactions. The CHESS operational environment includes processes and controls in the following areas:

- transaction processing



- error resolution and escalation, and
- security and operational resilience.

Operations is headed by the Chief Customer and Operating Officer of ASX.

Technology is responsible for the IT support and development of CHESS. The control environment in operation within Technology includes the following processes and controls areas:

- system operations
- change management
- security, and
- system resilience.

Technology is headed by the Group Executive Technology and Data and Chief Information Officer of ASX.

Logical access

ASX has an established enterprise-wide identity and access management policy that is available to all staff. A centralised Identity and Access Management team is responsible for the implementation and operation of controls relating to user maintenance (i.e. provisioning, changing and de-activating accounts including remote access), password management and the performance of user access reviews for the ASX network, application software, operating systems and databases relevant to CHESS. In addition, ASX maintains documented procedures and network security mechanisms for the prevention, detection and remediation of a malicious attack.

Change management

Changes relating to CHESS follow the enterprise-wide change management process that requires all changes to be logged in a centralised IT Service Management tool and approved, tested and monitored through the change life cycle. The process requires all changes to be assessed and signed off by the relevant Technology, Business and Change Approval Board (CAB) representatives prior to implementation, with the exception of those changes designated as standard changes. Standard changes are pre-authorised by the CAB and are very low risk changes that are well understood, repeatable and fully documented in an approved standard template. System and user documentation is updated, as appropriate, for each completed change.

Emergency changes also follow a defined and approved process, however, due to the nature of an emergency change, verbal or email approvals are obtained prior to implementation. Emergency changes may only be initiated if there is a corresponding incident ticket in the ITSM tool. Testing and formal approvals are performed as soon as practical following the change.

ASX maintains separate development, test and production environments for CHESS as well as segregation of duties between development and production migration and support activities.

Physical security

In addition to the head office in the CBD, there are two data centres – a primary data centre managed by ASX, and a secondary vendor-managed data centre (SDC). The SDC has dedicated and secured areas for ASX infrastructure, office space and control room, over which ASX maintains direct control of physical security. As such, the data centre provider is not considered a sub-service organisation for the purpose of this report.

ASX implements and operates physical security controls at both data centres to ensure access to these data centres is limited to authorised personnel. The controls include access provisioning and removal, regular review of physical access, as well as established policies and procedures, electronic and biometric security devices and CCTV.



Environmental controls

There are environmental control mechanisms in place at both data centres. These are maintained on a regular basis to facilitate continued operation of the systems. Maintenance activities for the primary data centre are managed by ASX, while the vendor manages the maintenance for the SDC. ASX monitors the completion of the maintenance per an agreed schedule.

Disaster recovery

ASX operates using a dual site model for all key operational and technology functions, with one operational site (also the primary data centre) outside of the Sydney CBD and the SDC approximately 30km from the CBD. ASX maintains a Business Continuity Framework and dedicated plan for each key business unit, including those operating CHES. A Disaster Recovery (DR) plan is in place for the system with testing conducted annually to ensure the system redundancy, secondary services and fail-over processes remain current and operational, and the system is able to meet the targeted 2 hour recovery timeframe.

In addition, all ASX staff have the ability to work remotely, however some job functions may require an element of physical access to technology assets. Remote access is secured using multi-factor authentication.

Following the successful May 2020 test, the annual DR test for CHES was planned for April 2021. However, as a hardware upgrade was underway at the time, management assessed that it was more efficient and safer to delay the FY21 test. A request to reschedule the DR test to July 2021 was reviewed and approved by senior management. The rescheduled test was successful.

IT processing

The following provides a summary of the other key technology processes relating to CHES:

- System backup: CHES application data is replicated to the secondary data centre. In addition, a regular backup cycle exists with tapes stored in an offsite facility by a specialist third party.
- System monitoring: There is automated monitoring in place for key functions and processing to support the operational integrity of the system with exception reporting and alerting to the relevant support teams for issues and failures. Network capacity, performance incidents, operational incidents and system availability is monitored and reported to management on a monthly basis.
- Job scheduling: A number of job schedules exist that are key to the successful processing of transactions in CHES. The status of the batch processes is monitored to ensure they are successfully completed. Changes to the schedules require approval prior to being implemented.



06 / Overview of CHESS

The clearing and settlement of equities is a critical component of the operation of Australia's financial markets. ASX Clear Pty Limited (ASX Clear) and ASX Settlement Pty Limited (ASX Settlement) are licenced clearing and settlement (CS) facilities under the Corporations Act. ASX Clear and ASX Settlement (the CS facilities) are currently the sole providers of clearing and settlement services for Australia's equity markets for cash market products traded on the ASX market, cash equities traded on the NSX and SSX markets, ASX-listed cash equities quoted and traded on the Chi-X market, and warrants, ETFs and TraCRs quoted on Chi-X.

Regulation

ASX Clear and ASX Settlement as licensed CS facilities under the Corporations Act must comply with the Financial Stability Standards (FSS) published by the RBA. In addition, they must:

- to the extent that it is reasonably practicable to do so, do all other things necessary to reduce systemic risk
- to the extent that it is reasonably practicable to do so, do all things necessary to ensure that the facility's services are provided in a fair and effective way, and
- have an adequate arrangement for supervising the facility.

CHESS

The CS facilities are licensed to operate the cash equities clearing and settlement facility and currently, they do this using CHESS.

Settlement conducted through CHESS, operates a Model 3 Delivery versus Payment (DvP) multilateral net batch settlement mechanism, exchanging cash for securities irrevocably. Cash payments are made across the RBA RITS infrastructure while securities title is transferred in CHESS. This is performed via batch processing each morning (known as the 'CHESS Batch') and is usually complete by 12.30pm.

The CHESS settlement facility provides ASX approved CHESS participants with the ability to meet settlement obligations, register and transfer holdings of securities via electronic CHESS messaging. In May 2014 the facility was expanded to facilitate the buying (applying for), selling (redeeming) and registration of units in unlisted managed funds (mFund).

CHESS was developed internally by ASX and has been operating since 1994. It is fully supported by a dedicated ASX technology team who performs all development requirements.

Transactions typically performed in CHESS include:

- client administration and maintenance
- security and holding administration and maintenance
- clearing and settlement processing (including daily batch)
- transfers between subregisters, and
- corporate actions.

ASX Settlement authorises Facility Users such as brokers, custodians, third party clearing participants, settlement agents and others to access CHESS, and settle trades made by themselves or on behalf of their clients. In addition, Facility Users use CHESS for the purposes of receiving clearing services from ASX Clear Pty Limited.

In administering the CHESS Subregister, the CS facilities provide additional services to issuers, participants and holders of securities, including transfers and conversions, monthly statements, corporate action processing, takeover acceptances, primary and secondary market capital raising, depositary receipts in foreign securities, and reporting services.



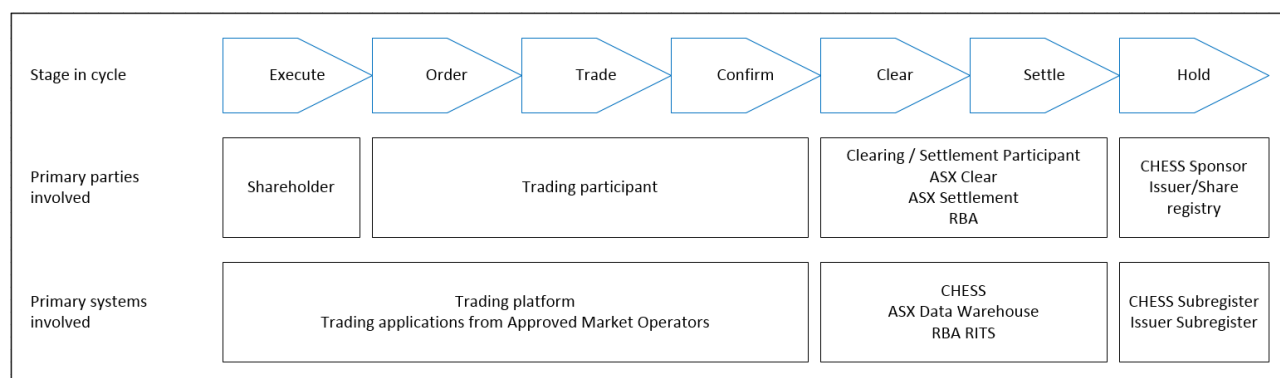
Holding Securities in CHESS

The CS facilities establish and administer a subregister of securities within CHESS, known as the “CHESS Subregister”. CHESS registers the title (ownership) of shares on its subregister and maintains a legal record of the balances of holdings in CHESS for securities holders. The Principal Register for any particular company is made up of the combined holdings registered on both the CHESS Subregister and the Issuer Sponsored Subregister (maintained by the issuer’s share registry). Holdings on CHESS are recorded on Holder Identification Number’s (HINs) and holdings on the Issuer Sponsored Subregister are held on a Security holder Reference Number (SRN). An SRN must be issued for each holding in a security but a HIN may hold multiple securities on the one identification number.

A security holder can only record their holding in the CHESS Subregister through an approved ASX Settlement Participant and accordingly is required to enter into a “Sponsorship Agreement” with that ASX Settlement Participant (referred to as a “CHESS Sponsor”). The Sponsorship Agreement sets out the terms and conditions under which the CHESS Sponsor maintains a client’s holdings and HIN.

The process of ordering, trading, clearing and settlement is a fully automated process. CHESS interacts with a number of ASX internal systems (such as the trading, risk management and data warehouse systems) as well as the systems and interfaces of Approved Market Operators, Facility Users and regulators.

An overview of the primary parties and systems involved in the trading cycle is depicted below.



CHESS Transaction Processing

Information between Facility Users and the clearing and settlement facility is communicated via a range of messages specified via a prescribed protocol. Each type of message allows for a business function to be performed. Within a functional area, there may be one or more sets of messages forming a sequence for that function. Information on CHESS messages can be found in the CHESS External Interface Specification manual.

ASX Settlement Services

Trade Acceptance Service (TAS)

A trade execution venue for ASX and non-ASX-quoted securities can use ASX’s Trade Acceptance Service (TAS) to put in place the clearing and settlement arrangements it needs to obtain an Australian market licence. ASIC is responsible for the granting of Australian market licences.

The TAS provides non-discriminatory access to clearing and settlement arrangements for other market operators which trade ASX and non-ASX-quoted securities.

The TAS enables trades in CHESS-eligible securities executed on any Australian licensed trading platform to be cleared and settled by the CS facilities in an identical fashion to trades executed on ASX’s own cash equity market.



Settlement Facilitation Service (SFS)

ASX Settlement provides settlement arrangements for approved listing venues (Approved Market Operators or AMOs) in respect of CHESS-eligible financial products listed on the markets of those AMOs.

There are two options for the settlement arrangements:

- a Transfer Facilitation Service where CHESS-eligible AMO-listed financial products can be transferred in real-time by ASX Settlement participants through CHESS. Payment is handled bilaterally by participants outside of CHESS, or
- a DvP Facilitation Service where CHESS-eligible AMO-listed financial products can be settled on a delivery versus payment (DvP) basis by ASX Settlement participants through the CHESS settlement batch.

ASX Settlement has also put in place arrangements for AMO-listed issuers to access the following services:

- ASX Primary Market Facility, which enables them to use DvP settlement for certain capital raisings, and
- a Corporate Actions Service where ASX Settlement may process a corporate action, through the settlement facility for CHESS-eligible AMO listed financial products.

CHESS Processing Times

CHESS is available for Registry processing from 5.10am and Facility Users processing from 6:00 am and closes at 7:00pm so that end of day processing can commence. The key components of end of day processing are CHESS reporting, corporate action processing and netting. Netting occurs on settlement date minus one (S-1), whereby the trades reported via ASX Trade or the TAS are netted together at participant, security and settlement account level. Facility Users are advised via CHESS messaging of the outcome of netting.

Processing errors are either flagged by CHESS or identified by ASX via operational monitoring of the system and transaction reports. Once identified, errors follow a defined escalation path.

System Change

During the period, there were changes made to the CHESS environment as part of usual management and support.

Control Objectives and Control Procedures

Set out in this report are the control objectives relevant to CHESS. The controls listed in Section 8 of the report have been designed to achieve each of the control objectives, and any references to the network, application, operating system and database are specific to CHESS.

Complementary User Entity Controls

Achievement of control objectives 7 and 8 as set out in Section 8 may also be dependent on controls performed by Facility Users as well as controls performed by other related party entities. These are known as Complementary User Entity Controls, or CUECs.

Internal controls, no matter how well designed and operated, can provide only reasonable, not absolute, assurance to management of achieving an entity's objectives. All internal control systems are subject to inherent limitations.

Each Facility User must evaluate its internal controls to determine if appropriate procedures are in place. In order to rely on the controls in this report, the Facility User's auditors should consider whether the following CUEC is operating.



Ref	Control Description	Relevant control objectives in section 8
CUEC 1	Facility users should perform a regular reconciliation of the ASX provided settlement obligation and security holdings from CHESSE to their internal records. Where variances are noted, ASX should be notified accordingly for investigation and resolution.	7 and 8



07 / Use and Scope of the Report

Requirement for the Report

The requirement for and scope of the independent audit is mandated in the ASX Settlement Operating Rules. The following table provides the requirements under section 12.3 of the ASX Settlement Operating Rules.

Rule Ref	Title	Content
12.3.1	ASX Settlement to conduct annual review	ASX Settlement must require an independent auditor to conduct an annual review of CHES and that review must comprise the matters specified in the Procedures (refer below).
12.3.2	Copy of audit certificate to be provided to Facility User	<p>If a Facility User requests that ASX Settlement provides a copy of any audit certificate arising from an annual review under Rule 12.3.1, ASX Settlement must, without charge, provide a copy of the audit certificate to that Facility User within 1 calendar month of:</p> <ul style="list-style-type: none"> (a) ASX Settlement receiving the audit certificate; or (b) the request <p>whichever is the later.</p>
12.3.3	Facility User may request other review of CHES	<p>If a Facility User gives notice to ASX Settlement requesting an audit certificate in relation to any review of CHES other than an annual review under Rule 12.3.1:</p> <ul style="list-style-type: none"> (i) the Facility User must in the Notice undertake to pay the fee for that service set out in the Fees and Charges Schedule; and (ii) ASX Settlement must request an independent auditor to conduct the requested review and supply an audit certificate in relation to the review to that Facility User as soon as reasonably practicable.
12.3.4	No other right to inspect ASX Settlement records	Except as expressly provided in these Rules, no Facility User has any right of access to, or right to inspect, ASX Settlement records.
12.3.5	Facility User to accept review by auditor	Each Facility User must accept and treat a review conducted by ASX Settlement's auditor under this Section as if that review were conducted by that Facility User's own auditor.

Note: The ASX Settlement Operating Rules define a facility user (under section 2.13) as a participant; an issuer of approved financial products; or a market licensee which is provided with a transfer service under Rule 4.1A.



The following provides the requirements under section 12.3.1 of the ASX Settlement Operating Rules – Procedures:

The review of CHES is to comprise:

- (a) reviewing ASX Settlement's information processing facilities and the integrity of CHES including:
 - (i) maintenance of security and confidentiality over the data of Facility Users;
 - (ii) security over the physical operation of CHES;
 - (iii) CHES backup and disaster recovery procedures; and
 - (iv) CHES access controls.
- (b) assessing the integrity and accuracy of information generated by CHES including:
 - (i) internal controls over data input by ASX Settlement; and
 - (ii) processing and reporting of transaction data.

Use of the Report

The report has been prepared for ASX Settlement to comply with the ASX Settlement Operating Rules. It is intended only for Facility Users who have used CHES and their auditors, who have sufficient understanding to consider it along with other information, including controls operated by the Facility User themselves, when assessing the risks of material misstatements of Facility User's financial reports and statements. While ASX understands Facility Users may provide the report to external parties, including their own auditors, ASX has no knowledge or understanding of the individual circumstances of Facility Users, their auditors, or other external parties.



08 / Control Objectives and Related Control Procedures

The scope in relation to this control report has been defined in the control objectives and associated control procedures for CHESS that have been included below. Any references made to the network, application, operating system and database are specific to CHESS.

Logical Access

Control Objective 1: *Controls provide reasonable assurance that logical access is restricted to prevent inappropriate or unauthorised access to the ASX network, application software, operating systems and underlying databases.*

Description of controls	Test performed by PwC	Results
1.1 The ASX Identity and Access Management Policy (the Policy) outlines the principles for restricting access to the network, application software, operating systems and underlying databases. The Policy is available to all staff.	Inspection Verified through inspection that the ASX Identity and Access Management Policy outlines the principles for restricting access to the network, application software, operating systems and underlying data and is available to all staff.	No exception noted.
1.2 Processes are in place for administering access to the network, application software, operating systems and the underlying databases. This includes approval of access granted and the timely termination of accounts no longer required.	Inspection For a sample of new users, verified through inspection that access to the network, application, operating system and database was approved prior to access being granted. Inspection For a sample of user revocations, verified through inspection that access to the network, application, operating system and database was revoked in a timely manner in accordance with the ASX Policy.	No exception noted.



Description of controls	Test performed by PwC	Results
	<p>Observation</p> <p>Verified through onscreen observation that an automated deactivation process is in place to disable terminated staff network access on the last day of service.</p>	
<p>1.3 Access to the application is authenticated and restricted through the use of password controls at the application and network layer. Per the Policy, controls include the following:</p> <ul style="list-style-type: none"> - authentication by a unique user ID and password - system enforced a minimum password length - the requirement to change passwords at predefined intervals, and - the lockout of user accounts after a pre-defined number of invalid sign-in attempts. 	<p>Observation</p> <p>Verified through onscreen observation that access to the application, operating system and database required the use of a user ID and password at the time of testing</p> <p>Inspection</p> <p>Verified through inspection that there are unique user IDs assigned to authenticate to the application, operating system and database at the time of testing.</p> <p>Inspection</p> <p>Verified through inspection at the time of testing that password parameters at the application, operating system and database layer are in line with the ASX Identity and Access Management Policy requirements which include:</p> <ul style="list-style-type: none"> - system enforced a minimum password length - users changing passwords at pre-defined intervals, and - lockout of user accounts after a pre-defined number of invalid sign-in attempts. 	No exception noted.



Description of controls	Test performed by PwC	Results
	<p>Inspection</p> <p>Where the password parameters are not in compliance with the ASX Identity and Access Management Policy requirements, validated through inspection that a current exemption for the deviation exists.</p>	
<p>1.4 Regular user access reviews are performed to confirm currency and appropriateness of access.</p>	<p>Inspection</p> <p>For a sample of application, operating system and database user access reviews, verified through inspection that the reviews were performed to confirm currency and appropriateness of access.</p> <p>Inspection</p> <p>Verified through inspection that all follow up actions resulting from the sampled user access reviews were completed in a timely manner in accordance to ASX Policy.</p>	<p>No exception noted.</p>
<p>1.5 Documented procedures are in place outlining the principles for safeguarding against the threat of malicious attack.</p>	<p>Inspection</p> <p>Verified through inspection of the Security Patching Policy, Malicious Code Management Standard and Cyber Security Escalation Procedure that principles for safeguarding against the threat of malicious attack are outlined.</p> <p>Inspection</p> <p>For a sample of monthly patching meetings, verified through inspection that the available patches are evaluated in line with the Security Patching Policy.</p>	<p>No exception noted.</p>



Description of controls	Test performed by PwC	Results
1.6 Network security measures include the following: firewalls, intrusion detection software, anti-virus software and incident response procedures are in place.	<p>Inspection and Observation</p> <p>Verified through inspection of network documentation and onscreen observation that a number of measures including firewalls, intrusion detection software and anti-virus software are in place.</p> <p>Inspection</p> <p>Verified through inspection of the Cyber Security Escalation Procedure and playbooks document that incident response procedures are in place.</p>	No exception noted.
1.7 Remote access to the network, application software, operating system and underlying databases is restricted and further security measures include digital certificates and/or RSA tokens.	<p>Observation</p> <p>Verified through onscreen observation that User IDs and passwords, as well as digital certificates or RSA tokens, are required to access the ASX network remotely</p> <p>Inspection</p> <p>Verified through inspection of the ASX Mobility and Remote Access Standard that remote access using RSA token is required to be authorised.</p> <p>Inspection</p> <p>For a sample of new remote access granted with the use of RSA tokens, verified through inspection that remote access to the ASX network, application software, operating system and database was authorised in accordance with the standard.</p>	No exception noted.



Description of controls	Test performed by PwC	Results
	Inspection For a sample of user departures with remote access accounts, verified through inspection that remote access was removed in a timely manner.	



Change Management

Control Objective 2: Controls provide reasonable assurance that all changes relating to the application software, operating system software and underlying databases within the CHES production environment are authorised and tested in accordance with the ASX change management policy.

Description of controls	Test performed by PwC	Results
2.1 Documented change management procedures are in place. All changes and upgrades follow the procedures.	<p>Inspection</p> <p>Verified through inspection that documented change management procedures are in place covering the change lifecycle.</p> <p>Inspection</p> <p>For a sample of changes, verified through inspection that they follow the documented change management procedures.</p>	No exception noted.
2.2 All changes are logged and monitored throughout the life cycle of the change.	<p>Inspection</p> <p>For a sample of changes, verified through inspection that changes were logged and monitored throughout the life cycle of the change.</p>	No exception noted.
2.3 Testing results are recorded, tracked and signed off.	<p>Inspection</p> <p>For a sample of changes, verified through inspection that testing results were recorded, tracked and signed off.</p>	No exception noted.
2.4 Test documentation exists, including test plans / strategies, test cases / criteria, test logs and issue reporting.	<p>Inspection</p> <p>For a sample of changes, verified through inspection that test documentation existed, including test plans / strategies, test cases / criteria, test logs and issue reporting.</p>	No exception noted.



Description of controls	Test performed by PwC	Results
2.5 Changes are subject to levels of system (i.e. developer) and user testing prior to implementation.	Inspection For a sample of changes, verified through inspection of relevant documentation that each change was subject to levels of system and user testing prior to implementation.	No exception noted.
2.6 Changes are subject to authorisation by Technology and/or the Business prior to implementation.	Inspection For a sample of changes, verified through inspection that each change was subject to authorisation by Technology and/or the Business prior to implementation.	No exception noted.
2.7 There is segregation of the development, test and production environments.	Observation Verified through onscreen observation that segregated development, test and production environments exist.	No exception noted.
2.8 Documented procedures for emergency changes are in place. Emergency changes are subject to formal authorisation prior to or as soon as practical after implementation. Emergency changes are documented and tested as soon as practical upon implementation.	Inspection Verified through inspection that documented procedures for emergency changes are in place. Inspection For a sample of emergency changes, verified through inspection that each change was formally authorised, tested and documented according to emergency procedures.	No exception noted.



Description of controls	Test performed by PwC	Results
2.9 All system and user documentation is updated accordingly.	Inspection For a sample of changes, verified through inspection that release notes were published and user documentation was updated.	No exception noted.



Physical Security

Control Objective 3: Controls provide reasonable assurance that physical security prevents unauthorised access to the primary and secondary data centres hosting CHES infrastructure.

Description of controls	Test performed by PwC	Results
3.1 Documented physical security policies and procedures are in place. This includes site visitation procedures for each category of access.	Inspection Verified through inspection that the documented physical security policies and procedures are in place.	No exception noted.
3.2 Access to the primary and secondary data centres is restricted and monitored through the use of electronic security devices and other arrangements.	Observation Verified through observation of the primary and secondary data centres that access to the ASX data centres is restricted and monitored through the use of electronic security devices and other arrangements, including: <ul style="list-style-type: none"> - exterior doors were locked - electronic access cards were required to enter the data centres, and - the data centres were monitored by CCTV. 	No exception noted.
3.3 Access requests to the primary and secondary data centres are approved prior to access being granted.	Inspection For a sample of access requests to the primary and secondary data centres, verified through inspection that access to the ASX data centres was approved prior to access being granted.	No exception noted.



Description of controls	Test performed by PwC	Results
3.4 Staff, visitors, contractors and customers are required to wear identification badges / tags.	Observation Verified through observation that staff, visitors, contractors and customers were required to wear identification badges / tags.	No exception noted.
3.5 Access is removed in a timely manner for employees who no longer require access to the primary and secondary data centres.	Inspection For a sample of terminated employees, verified through inspection that access to the primary and secondary data centres was removed in a timely manner.	No exception noted.
3.6 Regular access reviews are performed to confirm currency and appropriateness of access to the primary and secondary data centres.	Inspection For a sample of data centre user access reviews, verified through inspection that regular access reviews were performed to confirm currency and appropriateness of access to the ASX data centres. Inspection Verified through inspection that all follow up actions resulting from the sampled user access reviews were completed in a timely manner in accordance to ASX Policy.	No exception noted.



Disaster Recovery Procedures

Control Objective 4: Controls provide reasonable assurance that in the event of a disaster, measures are in place to enable CHESS to resume effective operations within two hours.

Description of controls	Test performed by PwC	Results
4.1 A documented Disaster Recovery Plan for the System is in place.	Inspection Verified through inspection that the Disaster Recovery Plan exists.	No exception noted.
4.2 The Disaster Recovery Plan for the System is tested on a regular basis.	Inspection Verified through inspection that the Disaster Recovery Plan was tested on a regular basis to enable CHESS to resume effective operations within two hours.	No Disaster Recovery test was performed during the period 1 July 2020 to 30 June 2021. The test was originally scheduled for April 2021. However, due to a hardware upgrade in May 2021, management assessed and approved a deferral of this test to July 2021. The Disaster Recovery test has been completed successfully in July 2021.



IT Processing

Control Objective 5: *Controls provide reasonable assurance that CHESS is backed up, and system processing and performance is monitored.*

Description of controls	Test performed by PwC	Results
5.1 Documented backup policies and procedures are in place.	Inspection Verified through inspection that backup policies and procedures have been documented.	No exception noted.
5.2 Application data is backed up on a regular basis.	Observation Verified through onscreen observation that the backup schedule for application data was setup in line with policy requirements. Observation and Inspection Verified through onscreen observation and inspection that an automated notification is generated upon failure of a backup job. Inspection For a sample of days, verified through inspection that backups were completed successfully. Inspection For a sample of incident tickets raised due to backup failures, verified through inspection that they were resolved in a timely manner.	No exception noted.



Description of controls	Test performed by PwC	Results
5.3 Backed up data is stored in an offsite secure location and restricted to authorised personnel.	<p>Inspection</p> <p>Verified through inspection of a copy of the agreement with the third-party service provider that backed up data is taken and stored in an offsite secure location.</p> <p>Inspection</p> <p>For a sample of days, verified through inspection that sign-off was obtained by an authorised representative indicating that backup tapes had been taken off-site for storage.</p> <p>Inquiry and Inspection</p> <p>Verified through inquiry with management and inspection of the listing of individuals with access to ASX data stored at offsite locations that they were authorised personnel.</p>	No exception noted.
5.4 Network capacity, performance incidents, operational incidents and system availability is monitored and reported.	<p>Inspection</p> <p>Verified through inspection of a sample of management status reports that network capacity, performance incidents, operational incidents and system availability are monitored and reported.</p>	No exception noted.



Description of controls	Test performed by PwC	Results
5.5 Automated system monitoring tools are used to monitor operational integrity. Exception reporting is used to alert staff of operational failures.	<p>Observation</p> <p>Verified through onscreen observation that system monitoring tools are utilised to monitor the operational integrity of the System.</p> <p>Inspection</p> <p>Verified through inspection that exception reporting functionality alerted staff of operational failures.</p>	No exception noted.
5.6 Job schedules are in place for batch processing. Each time a job schedule is run the results are documented and reviewed.	<p>Inspection</p> <p>Verified through inspection that job schedules are in place for batch processing.</p> <p>Inspection</p> <p>For a sample of days, verified through inspection that the job schedules results were documented and reviewed.</p>	No exception noted.
5.7 Changes to job schedules are approved.	<p>Inspection</p> <p>For a sample of changes to job schedules, verified through inspection that they were approved.</p>	No exception noted.



Environmental Controls

Control Objective 6: *Controls provide reasonable assurance that environmentally-controlled data centres exist to facilitate continuity of data processing operations.*

Description of controls	Test performed by PwC	Results
<p>6.1 The data centres contain the following environmental mechanisms</p> <ul style="list-style-type: none"> - fire detection and suppression systems - air conditioning systems - uninterruptible power supplies, and - water detection systems. 	<p>Observation</p> <p>Verified through observation of the primary and secondary data centres that they contain the following environmental mechanisms:</p> <ul style="list-style-type: none"> - fire detection and suppression systems - air conditioning systems - uninterruptible power supplies, and - water detection systems. <p>Inspection</p> <p>For the vendor-managed secondary data centre, for a sample of months, verified through inspection that management receives and reviews a report which includes information on these relevant environmental mechanisms.</p>	No exception noted.



Description of controls	Test performed by PwC	Results
6.2 A schedule of maintenance is performed on a regular basis to assist in preventing operational failure of the above environmental mechanisms.	<p>Inspection</p> <p>Verified through inspection of the primary and secondary data centres maintenance schedule that maintenance of the above environmental mechanisms is performed on a regular basis.</p> <p>Inspection</p> <p>For primary data centre, verified through inspection of a sample of maintenance reports that the preventative maintenance occurred in accordance with the schedule.</p> <p>Inspection</p> <p>For the vendor-managed secondary data centre, verified through inspection that management has performed a monitoring check to ensure maintenance for environmental mechanisms relevant to ASX have been completed in accordance with the pre-defined schedule.</p>	No exception noted.



CHES

Control Objective 7: *Controls provide reasonable assurance that the process of daily settlement is complete and accurate.*

Description of controls	Test performed by PwC	Results
7.1 Job schedules are in place for daily batch settlement processing. Each time the job schedule is run results are documented and reviewed.	<p>Inspection</p> <p>Verified through inspection that job schedules are in place for batch settlement processing.</p> <p>Inspection</p> <p>For a sample of days, verified through inspection that the job schedule results were documented and reviewed.</p>	No exception noted.
7.2 Documented CHES payment failure policies and procedures are in place.	<p>Inspection</p> <p>Verified through inspection that documented CHES payment failure policies and procedures are in place.</p> <p>Inspection</p> <p>For a sample of CHES payment failures, verified through inspection that they were investigated and resolved by management.</p>	No exception noted.



Description of controls	Test performed by PwC	Results
7.3 Documented CHES securities failure policies and procedures are in place.	<p>Inspection</p> <p>Verified through inspection that documented CHES securities failure policies and procedures are in place.</p> <p>Inspection</p> <p>For a sample of days, verified through inspection that securities failures were monitored and were followed up with the participants where required.</p> <p>Inspection</p> <p>For a sample of securities that did not settle within the required timeframe, verified through inspection that these failures were escalated to ASX Participants Compliance in a timely manner.</p>	<p>Exception noted.</p> <p>ASX securities failure procedures require CHES settlement shortfalls not completed after seven business days from initial settlement date (T+8) to be referred to ASX Participants Compliance for consideration and investigation.</p> <p>Our review noted for one out of five samples tested, the failure on T+8 was not referred to ASX Participants Compliance. This was subsequently settled the next day.</p> <p>This was self-identified and reported by management to ASX Participants Compliance as part of their internal review six months later.</p> <p>Management response</p> <p>If the shortfall had not settled the following day it would have appeared on the daily fails report. All other T+8 failures during the period were reviewed and no other exceptions have been identified – all were referred to ASX Participants Compliance on a timely basis.</p>
7.4 Extensions to the daily batch settlement process are recorded and actioned.	<p>Inspection</p> <p>For a sample of extensions to the daily batch settlement process, verified through inspection that each extension was recorded and actioned.</p>	No exception noted.

37/42



Control Objective 8: *Controls provide reasonable assurance that the securities holdings recorded and maintained by CHES, are complete and accurate.*

Description of controls	Test performed by PwC	Results
8.1 Documented procedures are in place for the processing and approval of new participants. This includes system-enforced segregation of duties (data entry and review) for the set up of new participants in CHES.	<p>Inspection</p> <p>Verified through inspection that documented procedures for the processing and approval of new settlement participants are in place.</p> <p>Observation</p> <p>Verified through on screen observation that CHES enforces segregation of duties for the setup of a new participant.</p>	No exception noted.
8.2 Documented procedures are in place for the processing and approval of new issuers. This includes system-enforced segregation of duties (data entry and review) for the set up of new issuers in CHES.	<p>Inspection</p> <p>Verified through inspection that documented procedures for the processing and approval of new issuers are in place.</p> <p>Observation</p> <p>Verified through on screen observation that CHES enforces segregation of duties for the setup of a new issuer.</p>	No exception noted.
8.3 Documented procedures are in place for the removal of participants. This includes system-enforced segregation of duties (data entry and review) for the removal of participants from CHES.	<p>Inspection</p> <p>Verified through inspection that documented procedures for the removal participants are in place.</p> <p>Observation</p> <p>Verified through on screen observation that CHES enforces segregation of duties for the removal of participant.</p>	No exception noted.



Description of controls	Test performed by PwC	Results
8.4 Documented procedures are in place for the removal of issuers. This includes system-enforced segregation of duties (data entry and review) for the removal of issuers from CHESS.	<p>Inspection</p> <p>Verified through inspection that documented procedures for the removal of issuers are in place.</p> <p>Observation</p> <p>Verified through on screen observation that CHESS enforces segregation of duties for the removal of issuers.</p>	No exception noted.
8.5 Documented procedures are in place for additions or modifications to the security holdings data.	<p>Inspection</p> <p>Verified through inspection that documented procedures for additions and modifications to the security holdings data are in place.</p> <p>Inspection</p> <p>For a sample of changes to securities holdings data, verified through inspection that documentation of the change existed and the change was processed by a team member of the Post Trade Operations team.</p>	No exception noted.



Description of controls	Test performed by PwC	Results
	<p>Inspection</p> <p>For a sample of :</p> <ul style="list-style-type: none"> - set up of payment facilities, - modification of payment facilities and - cancellation of payment facilities <p>verified through inspection that approval has been received from the participant.</p> <p>Inspection</p> <p>For a sample of transfers of holdings from Issuer Sponsored Subregister to CHESS Sponsored Subregister, verified through inspection that the transfers were processed completely and accurately.</p>	
<p>8.6 In the event that ASX is notified by a Facility User of a discrepancy in either the settlement obligations or security holdings, an incident record is raised and tracked to resolution.</p>	<p>Refer to control 7.7 above.</p>	<p>Refer to control 7.7 above.</p>



Control Objective 9: *Controls provide reasonable assurance that the processing of transactions initiated by ASXS, participants or registries is complete and accurate.*

Description of controls	Test performed by PwC	Results
9.1 CHESS messages follow predefined CHESS parameters to prevent inappropriate message structure.	<p>Inquiry</p> <p>Verified through inquiry with management that there is a predefined message format required for CHESS messages and that there had not been changes to the method of validating CHESS messages during the review period.</p> <p>Inspection</p> <p>For a sample of CHESS messages, verified through inspection that the messages were validated against the predefined parameters before being accepted.</p>	No exception noted.
9.2 CHESS messages received and sent are logged. Exception reports are produced and any unprocessed CHESS messages are actioned.	<p>Inspection</p> <p>Verified through inspection of CHESS message logs that CHESS messages received and sent were logged.</p> <p>Inspection</p> <p>Verified through inspection that the following exception reports are produced and procedures are in place for the review and actioning of any unprocessed CHESS messages:</p> <ul style="list-style-type: none"> - Admin General Error Report - Corporate Actions Error Report. 	No exception noted.



Description of controls	Test performed by PwC	Results
9.3 Segregation of duties (data entry and review) is system-enforced for the set up and cancellation of payment facilities.	Observation Confirmed through onscreen observation that segregation of duties is required for the set up and cancellation of payment facilities.	No exception noted.
9.4 In the event of operational issues resulted by the incomplete or inaccurate processing of transactions in CHEAD, an incident is logged and tracked to resolution by ASX Operations or Technology team.	Inspection Verified through inspection that documented policy is in place for operational incident management. Inspection For a sample of operational issues resulted by the incomplete or inaccurate processing of transactions in CHEAD, verified through inspection that the incident was logged and tracked to resolution by ASX Operations or Technology Team.	No exception noted.