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SEM Market Report of Factual Findings

Report of Factual Findings
For the period ended 31 December 2019

Date: 5 June 2020

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Report of Factual Findings – Notice re Distribution and Publication

This notice concerns the Report of Factual Findings to the Commission for Regulation of Utilities ("CRU") and the Utility Regulator ("UR") (together the Regulatory Authorities (the "RAs")) on the SEM Market Audit for the 15 months ended 31 December 2019 dated 5 June 2020 (the "Report").

This notice does not apply to the RAs or Parties to the Code who have signed the "Terms of Release to the Parties to the Code" letter (including their employees acting within the scope of their employment duties).

The requirement for the SEM Market Audit is set out in the Single Electricity Market (SEM) Trading & Settlement Code ("the Code") designated on 3 July 2007 and as amended from time to time. This Report was prepared by Deloitte Ireland LLP (a partnership established in Ireland and with its registered address at Deloitte & Touche House, Earlsfort Terrace, Dublin 2, Ireland) ("Deloitte").

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No work has been carried out nor have any enquiries of RAs or Single Electricity Market Operator management been made since 10 March 2020. The Report does not incorporate the effects, if any, of any events or circumstances which may have occurred or information which may have come to light subsequent to that date. Deloitte makes no representation as to whether, had Deloitte carried out such work or made such enquiries, there would have been any effect on the Report. Further, Deloitte has no obligation to notify you if any matters come to its attention which might affect the continuing validity of the comments or conclusions in the Report.

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Unless otherwise stated, all terms and expressions used in this notice shall have the same meaning attributed to them in the Code.

This notice shall be governed and construed in accordance with the laws of Ireland. The courts of Ireland will have exclusive jurisdiction to settle any claim, dispute or difference which may arise out of or in connection with this notice.

Contents

1.   Introduction

The scope of the Market Audit for the period 1 October 2018 – 31 December 2019 is set out in the "SEM-19-051: Terms of Reference for the Market Audit 2019" published 17 September 2019 (the "Terms of Reference"), in accordance with paragraph B.16.1.6 of the SEM TSC. For this period the Terms of Reference require that the work is reported on an Agreed Upon Procedures (AUP) basis under ISRS4400, and the associated list of AUPs was published as SEM-19-067 on 28 November 2019 and as revised on 30 April 2020.

As noted in the Terms of Reference "The SEM Committee has decided that the auditors work will be conducted in a different manner to previous audits to account for the number of known issues already identified… the broad principle of the approach for calculations impacted by known issues and where fixes have been applied during the year will be that the Auditor will be directed to focus testing on calculations performed after application of the fix. This will include resettlement/correction of periods affected by the known issues as well as settlement of later periods. Focusing testing on calculations performed at resettlement after fixes have been deployed will facilitate identification of any additional audit findings (over and above existing known issues) and reduce the risk of expanding significant effort testing periods with existing known noncompliances present."

We have included in this report of factual findings details of all differences noted during our work including our detailed recalculation of half-hourly settlement values. In a number of cases these are related to known issues and we have indicated where that is the case in our results. A known issue report is published on the SEMO website.

The matters reported are those arising from execution of the AUP; other issues may exist which are not included in our AUP scope. Unless otherwise specified, words and expressions used in this document have the same meaning as defined in the Code.

Use of this document

This Report of Factual Findings is made solely for the Regulatory Authorities, as a body, in accordance with paragraph 2.133 of the Code under our Market Audit Contract dated 26 October 2018. Our work has been undertaken so that we might state to the Regulatory Authorities those matters we are required to state to them in our report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Regulatory Authorities and the Parties as a body, for our work and for this report. Parties to the Code may only rely on this report if they have agreed in writing to be bound by the conditions under which it has been prepared, in line with the engagement letter.

2. Report of Factual Findings

To: The Regulatory Authorities
We have performed the procedures agreed with you and enumerated below with respect to the Single Electricity Market Operators operation and implementation of the trading arrangements, procedures and processes required by the Trading and Settlement Code (the "Code") for the period 1 October 2018 – 31 December 2019 as set out in the Terms of Reference, set forth in the accompanying schedules.

Scope of our work and factual findings
Our engagement was undertaken in accordance with the International Standard on Related Services 4400 applicable to agreed-upon procedures engagements.
The procedures were performed solely to assist you, the Regulatory Authorities, with your responsibility to appoint a Market Auditor to conduct an audit of the Code, its operation and implementation and the operations, trading arrangements, procedures and processes under the Code at least once a year. The published Terms of Reference determined the scope of our work for the period 1 October 2018 – 31 December 2019 to be in the form of an Agreed Upon Procedures engagement, which we have performed and report herein.

The procedures we performed and the related factual findings are set out in Section 3 below.

Because the procedures and factual findings outlined in Section 3 do not constitute either an audit or a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, we do not express any assurance on the Single Electricity Market Operators operation and implementation of the trading arrangements, procedures and processes required by the Code for the period 1 October 2018 – 31 December 2019.

Had we performed additional procedures or had we performed an audit or review of the financial statements in accordance with International Standards on Auditing or International Standards on Review Engagements, other matters might have come to our attention that would have been reported to you.

Use of report
This Report of Factual Findings is made solely for the Regulatory Authorities, as a body, in accordance with paragraph 2.133 of the Code under our Market Audit Contract dated 26 October 2018. Our work has been undertaken so that we might state to the Regulatory Authorities those matters we are required to state to them in our report and for no other purpose. Our report must not be made available, copied or recited to any other party without our express written permission. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Regulatory Authorities and the Parties as a body, for our work and for this report. Parties to the Code may only rely on this report if they have agreed in writing to be bound by the conditions under which it has been prepared, in line with the engagement letter. This report relates only to the items specified in Section 3 and does not extend to the Single Electricity Market Operator, taken as a whole.

James Schmidt
For and on behalf of Deloitte Ireland LLP
Chartered Accountants and Statutory Audit Firm
Deloitte & Touche House, Earlsfort Terrace, Dublin 2

Date: 5 June 2020

3. Agreed Upon Procedures and Factual Findings

3.1 Accession and Registration

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section B.7; B12, Agreed Procedure 1; Agreed Procedure 18	• Record the Accession and Registration process, implemented by SEMO, to register Participants/Units as part of the market activities. • Record the Participant and unit deregistration process implemented by SEMO to deregister Participants / Units as part of the market activities.	• Walkthrough of the Accession and Registration processes implemented by SEMO – including participant and unit registration and unit deregistration – was performed. • During the period there were no instances where a participant deregistered from the market. • In performing the walkthrough and obtaining data to support sample selection for this procedure we note the following exceptions in respect of the publication of registration related data: a) A defect exists in the Daily Registered Units/Parties reports published on the SEMO Website causing the Registration Date field to report the last modification date instead of the Effective Date. b) Eight parties were published on the Static Report despite their accession deed not being completed c) Three units were published on the Static Report despite their registration not being completed. d) One unit deregistered during the period in scope has been not classified as "Deregistered" in the Manual List of Registered Units updated at 24/12/2019 (Timing requirement: "Before Deregistration date")	a) A defect in the Daily Registered Units/Parties Report was identified as part of audit discussions, by which the last modification date is reported as the Registration Date instead of the Effective Date, when a unit/party is registered/becomes effective. This defect will be assessed for future delivery in a Market Systems release and SEMO will consider how this can be captured in the interim period. SEMO will ensure that this is captured for all registrations going forward. b) These Parties are not fully registered in the market (with one exception) They are appearing in the Static Report as this report pulls information directly from the Market Participant Interface. These Parties were approved in the MPI but do not have any units registered in the market. SEMO publish a manual report of Registered Parties and Units which reflects all registered Parties. c) These Units are not fully registered in the market(with one exception) They are appearing in the Static Report

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
			as this report pulls information directly from the Market Participant Interface. These Units were approved in the MPI but do not have any units registered in the market. SEMO publish a manual report of Registered Parties and Units which reflects all registered Units. o For two units the Participant originally requested to register in the Capacity Market but did not complete their application for the Balancing Market in 2017 o For one unit, the Participant originally requested to register in the Capacity Market but did not complete their application for the Balancing Market in 2017 but has subsequently become active in the balancing market in 2020. d) This has now been updated in the List of Registered Units.
	• For a sample of 5 new party registrations, and new unit registrations; document all relevant registration requirements in terms of Section B7 of the Code and AP1 have been met. • For a sample of 2 parties that have acceded to the Code (intermediaries), document all requirements of registration as set out section B.11 of the Code as well as AP1.	Sample testing was completed in accordance with the Agreed Upon Procedure set out. The following exceptions were noted: e) For one party the Market Operator assessed the Application Forms provided by the Applicant and submitted an Accession Deed to the Applicant for the new SEM registration purposes, 70 working days after the receipt of the Application	e) This registration was progressing in advance of Go Live. While the Code timelines were not met, the party was effective for Go Live. f) This registration was progressing –in advance of Go Live. While the Code timelines

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
		Forms (Lockdown period's timing requirement: within 60 working days from the receipt of the Application Forms, for applications submitted up to the 1st June 2017) f) For one party the Market Operator submitted the executed Accession Deed to the Applicant for the new SEM registration purposes, 221 working days after the receipt of the Application Forms (Lockdown period's timing requirement: within 60 working days from the receipt of the Application Forms, for applications submitted up to the 1st June 2017) g) For one unit the Market Operator could not evidence that the final registration meeting was held with the Participant and the System Operator to determine the Effective Date [AP1 / 3.2.4 / 4.1] h) For two units the Market Operator could not evidence that the Commencement Notice was provided to the System Operator and Meter Data Provider by email. The Commencement Notice sent to the Party or Applicant was issued the day before the Effective Date (timing requirement: "As early as possible but at least 4 WD (working days) prior to the Effective Date") [AP1 / 3.2.4 / 4.5] i) For one unit the Market Operator could not evidence that the initial Unit registration meeting/conference call was held with the System Operator, External Data Provider(s), Party or Applicant - for the purposes of identification of a possible Meter Data Export Date and the Effective Date. [AP1 / 3.2.3 / 3.1] j) For three units the Market Operator could not evidence that the Unit ID was communicated to the applicant by email. [AP1 / 3.2.2 / 2.1] k) For three units the Market Operator could not evidence that the Commencement Notice were provided to the Party, to System Operators and	were not met, the party was effective for Go Live. g) The date was communicated to relevant stakeholders and a meeting was held in the required timeframe. h) For both units SEMO identified that : • The Commencement Notice was not provided to the System Operator and Meter Data Provider per requirements in AP1 (at least 4WD prior to Effective Date). SEMO has updated our internal process. • A Commencement Notice was provided to the Party the day before its Effective Date. SEMO's test environment was unavailable as a result of a General System Failure (12/06/19 - 17/06/19) therefore SEMO was unable to complete testing and issue a Commencement Notice within the required timeframe. SEMO is reviewing the registration process. i) For one unit, SEMO identified that there was no record of an initial Registration Meeting, however calls took place with individual parties in this instance rather that a scheduled call with all parties.

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
		to External Data Provider(s) by email. [AP1 / 3.2.4 / 4.5]	j) For three units, SEMO identified there was no record provided of communication of Unit ID. For these three units the Participant had visibility of the Unit IDs within the market system however they did not receive formal notification of this ID by email from SEMO. k) For three units, SEMO identified that no record provided of communication of Commencement Notice to Party, System Operator and External Data Providers. For these three units no Commencement Notices were issued in these cases.
	• For a sample of 2 Participant and unit deregistrations, document if the requirements of Section B.12 of the Code and AP18 have been met.	• During the period there were no instances where a participant deregistered from the market and hence no testing was required. • Sample testing for units was completed in accordance with the Agreed Upon Procedure set out. The following exceptions were noted: l) For one unit the Market Operator submitted appropriate Deregistration details to relevant System Operator and Relevant Meter Operator more than 30 days after the receipt of Deregistration Form (timing requirement: "Within 5 WD of receipt of Deregistration Form") [AP 18 / 3.1 / 2] m) For one unit the Market Operator sent Deregistration Consent Order 8 days after the	l) For one unit, SEMO identified: Deregistration details sent to relevant System Operators and Meter Data Provider were not provided by the deadline after receipt of the Deregistration Form (AP18 says "Within 5WD of receipt of Deregistration Form". m) For one unit, SEMO identified: Deregistration Consent Order sent to Participant, System Operators, Meter Operator and Regulatory Authorities was not

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
		Deregistration date to Participant, System Operators, Relevant Meter Operator, and Regulatory Authorities (timing requirement: "Before Deregistration date") [AP 18 / 3.1 / 8]	provided by the deadline after receipt of the Deregistration Date (AP18 says "Before Deregistration Date".
	• For a sample of 2 Participants who failed to comply with the Credit Cover Increase Notice within two working days of issue from the total list provided by SEMO, document if the Suspension Order was issued in accordance with AP18.	There were no instances identified where a participant failed to comply with a Credit Cover Increase Notice and hence no testing was required.	-

3.2 Imbalance Settlement Price Calculation and Recalculation

A known defect exists affecting SEMO's ability to provide the required data. The defect, 117257 / 6031 prevents access of MPI information before the participant registration date. This affects between one and three participants across all testing dates. In these cases the underlying settlement data was obtained directly from SEMO.

Unless otherwise stated the following dates and settlement runs have been selected for testing:
- 21 December 2018 (Initial and M+4 settlement)
- 8 March 2019 (Initial and M+4 settlement)
- 24 April 2019 (Initial and M+4 settlement)
- 15 November 2019 (Initial settlement)

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section E.3	• For a sample of 4 days during the testing period (1 October 2018 – 31 December 2019), chosen to test between major software releases, obtain all input data (Imbalance Settlement data and Bid Offer Acceptance data) that is used to calculate the imbalance settlement price. Mathematically recalculate imbalance settlement price, based on the market code (E.3) and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent resettlement runs performed during the testing period.	For the selected testing dates the required input data was obtained and the imbalance settlement price (PIMB) calculated and compared to the SEMO reported value. No differences over 1% were identified.	-
Section F.6	• For a sample of 4 days during the testing period, chosen to test between major software releases, obtain all available input data (Registration Data, Imbalance settlement price, Bid Offer Prices, Loss adjusted accepted quantities) that is used to calculate the C Premium/C Discount for all units. Recalculate C Premium/C Discount, based on the market code (F.6) and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent	For the selected testing dates the required input data was obtained and the value of CPremium / CDiscount calculated for all units and compared to the SEMO reported value. One difference was identified in our testing for settlement date 21 December 2018, this was impacted by QBOA related issues.	• CPREMIUM/CDISCOUNT calculated correctly at M4 resettlement after QBOA fixes applied after initial settlement (21st Dec 2018)

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
	resettlement runs performed during the testing period.		
Section F.9	• For a sample of 4 days during the testing period, chosen to test between major software releases, obtain all input data (Imbalance settlement parameters, bid offer price, bid offer acceptance, premium/discount for under/over generation, Loss adjusted information imbalance) that is used to calculate uninstructed imbalance for a given unit. Recalculate uninstructed imbalance, based on the market code (F.9) and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent resettlement runs performed during the testing period.	Two differences were identified as part of the recalculation. In calculating the Uninstructed Imbalance Charge (CUNIMB) the SEMO systems incorrectly calculate a non-zero value for Pump Storage Units in Pumping Mode. This has been confirmed by SEMO as a defect. For the selected testing dates the required input data was obtained and uninstructed imbalance recalculated for all units and compared to the SEMO reported value. No differences over 1% were identified.	Ref: "Uninstructed Imbalance Charge the SEMO systems incorrectly calculate a non-zero value for Pump Storage Units in Pumping Mode." – Confirmed as defect 6155 with Vendor. Working to prioritise for upcoming release.

3.3 Settlement Production and returns (to include all the Market Operator Charges)

A known defect exists affecting SEMO's ability to provide the required data. The defect, 117257 / 6031 prevents access of MPI information before the participant registration date. This affects between one and three participants across all testing dates. In these cases the underlying settlement data was obtained directly from SEMO.

Unless otherwise stated the following dates and settlement runs have been selected for testing:
- 21 December 2018 (Initial and M+4 settlement)
- 8 March 2019 (Initial and M+4 settlement)
- 24 April 2019 (Initial and M+4 settlement)
- 15 November 2019 (Initial settlement)

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section F.2	• For a sample of 4 days during the testing period, chosen to test between major software releases, obtain all input data (Technical Offer Details, Dispatch Instructions, Outturn Availability) that is used to calculate the Dispatch Quantity (QD) for a given unit. Recalculate the QD, based on the market code (Appendix O) and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1% and greater than 1MWh. For each day tested within the period, recalculate for the initial run and any subsequent resettlement runs performed during the testing period	For the selected testing dates the required input data was obtained and used to profile dispatch instructions to calculate QD which was compared to the SEMO reported values. Dispatch Quantity differences were identified across testing dates, as follows: • 1,525 differences were noted for wind units in D+4 profiling, in all cases no difference was seen for the same units and periods at M+4. This was confirmed to be related to existing known issue/defect 5766 relating to the correct time weighted averaging of availability; • 13 differences were noted for pump storage units which were confirmed to be related to existing known issue/defects 5806 and 5897 relating to correct processing of DESY instructions. All differences were corrected during M+4 resettlement; • Five differences were noted for pump storage units where the SEMO QD value could not be agreed to Deloitte recalculation, this was confirmed to relate to an existing defect. • If synchronised to a value below minimum stable generation (including to 0) pump storage units are incorrectly profiled to minimum generation by the SEMO instruction profiler (this rule applies for other unit types but not pump or battery storage	• Agree with points 1-3, confirmed as related to Known Defects. • Issue with Instruction Profiling for pumped storage units (set to MIN GEN).Raised with Vendor for investigation. #158,699 • When unit is in pumping/transition mode and QD has been set to QM in SR. CSB reports QD as equal to the QM value, which it does for purposes of CUNIMB not applying to PS units in Pump or transition mode (TSC F.9.4.2), but the profiler and QBOA calculation follows the profiling rules and calculates the QBOA profiles to the pumping capacity of the unit (TSC Appendix O Table 9). The Profiled QD can be viewed

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
		units). This affected six periods of the dates tested. During our testing it was noted that the QD value published in participant settlement reports for pump storage units whilst in pumping mode is set to the QM value rather than the profiled QD. Whilst the underling QD value is calculated and used in calculation by SEMO this is not the value published in the settlement report.	by participant in Public report, *REPT_068.*
Section F.8	• For a sample of 4 days during the testing period, chosen to test between major software releases, obtain all input data (Metered Quantity, Curtailed quantity, Bid offer details, physical notification, outturn availability) that is used to calculate the curtailment price (PCURL). Recalculate curtailment price, based on the market code (F.8) and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent resettlement runs performed during the testing period.	For the selected testing dates the required input data was obtained and the curtailment price for each relevant unit calculated and compared to the SEMO reported values. Five differences were identified (of which two relate to M+4 resettlement of original differences noted at D+4). The exceptions arose from a SEM system issue in which trades submitted prior to gate closure were not updated in the SEM system until after the PCURL calculation run.	The system was set up to run the PCURL calculation using an offset of 50 minutes in line with the calculation of the Market Back Up Price. Following discussions with the software vendor, we are investigating making changes to increase the offset time of the PCURL calculation. This is intended to allow for a more accurate calculation, in the event of a delay in the receipt of the input data used in this calculation. Please be advised that all highlighted instances were of no material impact.
Section G.7	• For a sample of 4 days during the testing period, chosen to test between major software releases, obtain all input data (Registration Data, Metered quantity, Market Operator Charge Parameters) that is used to calculate the Variable (CVMO) and Fixed Market Operator Charge (CMOA) for a given unit. Recalculate the market operator charges, based on the market code (G.7) and document the value obtained by SEM. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent	For the selected testing dates the required input data was obtained and the variable and fixed market operator charges calculated and compared to the SEMO reported values. 292 differences were identified in calculation of the variable market operator charge: • 287 differences were noted during the development of our calculations. These are due to a known defect in SEM systems causing the QM of Trading Sites to drop to zero when a change is made to the Registration Data - a manual process is in place by SEM to flag and correct this	• Regarding Trading Sites: Confirmed workaround (apply IT Script & Re-Import) applied only after code release. However, after review this is now implemented in daily settlement checks from the 30th September 2019 Fixed as part of Release D (October 2019)

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
	resettlement runs performed during the testing period.	however was not applied on the date tested. This affected one Supplier Unit. • Five differences were identified across selected dates due to a known defect in SEM systems, 6010, causing the Trading Site to be dropped on Registration data import. Although a manual workaround has been identified for this issue the specific differences noted occurred prior to implementation of this workaround.	Exception period scheduled for M4 / M13 Resettlement. Defect 6010 added to Known Issues Report (https://www.sem-o.com/documents/general-publications/I-SEM-Known-Issues-Report-19-Jul-2019.pdf). Under specific circumstance on completion of a registration import in Settlement System (CSB), Trading Site Unit links to GU/SU IDs were removed. This was an intermittent issue and only affected selection of units. An interim manual workaround was derived until Release D was introduced into Production in October 2019.
Section F.6	• For calculations performed on or after Release C of the Market Systems select a sample of 4 days from the testing period including dates resettled from initial settlement prior to Release C. For these dates obtain all input data (Dispatch quantity, final physical notification, commercial offer details) that is used to calculate the QBOA for a given unit. Recalculate QBOA, based on the market code (F.6.2) and record any difference to the value obtained by SEMO for the calculations performed on or after Release C of the Market Systems]. Document SEMO's response to any differences over 1% and greater than 1MWh. For each day tested within the period, recalculate any subsequent resettlement runs performed during the testing period on or after Release C of the Market Systems.	For the selected testing dates M+4 resettlement was performed after Release C of the Market Systems and was subject to testing, with the exception of 15 November 2019 where initial settlement was tested as this occurred after Release C. The required input data was obtained and QBOA recalculated based on the Market Code. Differences were analysed to identify common scenarios and explanations sought from SEMO for each of the scenarios. Of the differences identified the majority related to existing known issues and defects: a) Two were confirmed as due to defects which were resolved at M+13; b) 47 are related to known issues ("error in slope") which prevent SEMO calculation of QBOA;	a) The two QBOA defects were corrected at M+13, matching Deloitte value. b) The 47 periods confirmed to be related to Known Issue #113353; QBOA defect for Error in Slope messages resulting in no QBOAs. c) The items confirmed as differences as a result of SEMO calculating a zero were corrected during M+4 resettlement. This was related to defect 5893. d) The item confirmed as related to Defect ID 5873 Closing PISP instructions profiled Cold when

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
	For a sample of 5 manual QBOA overrides during the testing period. Obtain the initial QBOA values and SEM manual adjustment. Confirm these overrides are consistent with the process documented and appropriate as per the TSC.	c) 57 were the result of SEMO calculating a zero value which was confirmed as relating to defect 5893; d) One was due to a known issue that can occur when instructions are received during the initial synchronisation period (defect 5873). In addition the following differences were identified and did not relate to existing known defects: e) 4 were caused by an error in the derivation of Actual Availability (qAA); f) One was due to a previously unidentified defect which is now under investigation with the vendor.	should be Hot and profiling for longer than expected. e) The qAA defect has been raised with vendor. It has been confirmed as a defect SF #01360187 and awaits further analysis. f) Raised with vendor for further investigation #158,568 - Incorrectly Calculated QAB.
Section F.11	• For calculations performed on or after Release C of the Market Systems select a sample of 4 days from the testing period including dates resettled from initial settlement prior to Release C. For these dates obtain all input data required (Registration Data, Final Physical Notifications, No Load Cost, Bid Quantities, Bid Offer Price) to calculate the Fixed Cost and Make Whole Payments for a given unit. Recalculate Fixed Cost (CFC) and Make Whole Payments (COCMWP), based on the market code (F.11) and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent resettlement runs performed during the testing period.	For the selected testing dates M+4 resettlement was performed after Release C of the Market Systems and was subject to testing, with the exception of 15 November 2019 where initial settlement was tested as this occurred after Release C. The data to calculate Fixed Cost Charge (CFC) and Male Whole Payment Charge (CMWP) was obtained and recalculated values were compared to SEMO report values. Differences were identified as follows: a) Differences were identified due to a known issue affecting Pump Storage Units. When calculating the Fixed Cost Charge the market systems incorrectly consider periods where Pump Storage Units are in pumping mode as part of a continuous operating period. This has been confirmed by SEMO as a defect. b) A difference was noted in the calculation of CREVMWP and COCMWP for one pumped storage unit, this is due to the issue identified in the QD testing where the unit is incorrectly profiled to minimum generation if synchronised below this level. c) The Make Whole Payment General Public Report has a currency code of Sterling (GBP) for all charges relating to Northern Ireland registered units however, with the exception	a) Ref: "Uninstructed Imbalance Charge the SEMO systems incorrectly calculate a non-zero value for Pump Storage Units in Pumping Mode." – Confirmed as defect 6155 with Vendor. Working to prioritise for upcoming releases MI & CSB both needed in fix from Vendor. b) Issue with Instruction Profiling for pumped storage units, Defect #158,699 raised with vendor. c) and d) The issues with the values for the Make Whole Payment General Report and COCMWP and CREVMWP included in the settlement reports are incorrectly reported in local currency rather than Euros – This is confirmed defect #159462 raised with vendor.

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
		of Fixed Cost Charge (CFC), the value included in the report is denominated in Euros. d) The values for COCMWP and CREVMWP included in the settlement reports are incorrectly reported in local currency rather than Euros.	
Section F.12	• For a sample of 4 days during the testing period, chosen to test between major software releases, obtain all input data (Imperfections Annual Parameters, Metered quantity) that is used to calculate the imperfections charge for a given unit. Recalculate imperfections charge (CIMP), based on the market code (F.12) and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent resettlement runs performed during the testing period.	For the selected testing dates the required input data was obtained and the imperfections charge calculated for each unit and settlement period and compared to the SEMO reported values. 292 differences were identified in Imperfections Charge (CIMP) testing: • 287 differences were identified as part of development of our calculation due to a known defect in SEM systems causing the Metered Quantity (QM) of Trading Sites to drop to zero when a change is made to the Registration Data - a manual process is in place by SEM to flag and correct this however was not applied on the date tested. This affected one Supplier Unit. • Five differences were identified across the selected testing dates due to a known defect in SEM systems, 6010, causing the Trading Site to be dropped on Registration data import.	• There is a known defect in SEM systems causing the QM of Trading Sites to drop to zero when a change is made to Registration Data and results in incorrect CIMP values. A manual process has been developed by SEMO to flag and correct this issue, which was not fully in place on the date tested (21 December 2018) but is now an established part of the settlement process. • Defect 6010 added to Known Issues Report (https://www.sem-o.com/documents/general-publications/I-SEM-Known-Issues-Report-19-Jul-2019.pdf). Under specific circumstance on completion a registration import in Settlement System (CSB), Trading Site Unit links to GU/SU IDs were been removed. This was an intermitting issue and only affected selection of units. An interim manual workaround was derived until Release D was introduced

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Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
			into Production in October 2019.
Section F.14	• For a sample of 4 days during the testing period, chosen to test between major software releases, obtain all input data (Registration Data, Metered quantity, Residual Error Parameters) that is used to calculate the Residual Error Charge (CREV) for a given unit. Recalculate Residual Error Charge, based on the market code (F.14) and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent resettlement runs performed during the testing period.	For the selected testing dates the required input data was obtained and the residual error charge calculated and compared to the SEMO reported value. No differences over 1% were identified.	-
Section F.17, F.19	• For a sample of 4 days during the testing period, chosen to test between major software releases, obtain all input data (Capacity Parameters, Metered Quantity) that is used to calculate the Capacity charge (CCC), Capacity Payment (PCP) and Difference Payment Socialisation Charges (CSOCDIFFP) for a given unit. Recalculate Capacity charge, Capacity Payment and Difference Payment Socialisation Charge, based on the market code (F.19, F.17) and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent resettlement runs performed during the testing period.	179 differences were identified during development of our recalculation in both Difference Payment Socialisation Charges (CSOCDIFFP) and Capacity Charge (CCC). The differences resulted from a known defect, which caused the QM of Trading Sites to drop to zero when a change is made to the Registration Data - a manual process is in place by SEM to flag and correct this however was not applied on the date tested. For the selected testing dates the required input data was obtained and CCC, PCP and CSOCDIFFP recalculated for all units and settlement periods and compared to the SEMO reported value. Three differences were identified CCP testing. Of these: • Two were due to a known defect in SEM Systems, 5980, causing the CRM Unit Capacity to not update for one unit, resulting in no CCP being calculated. A manual workaround was implemented prior to one of the two differences identified but was not applied, although this has been corrected in M+4 resettlement.	CCC/CSOCDIFFP: There is a known defect in SEM systems causing the QM of Trading Sites to drop to zero when a change is made to Registration Data and results in incorrect CCC, CCP and CSOCDIFFP values. A manual process has been developed by SEMO to flag and correct this issue, which was not fully in place on the dated tested but is now an established part of the settlement process. CCP: • Known Issues Report Defect ID 147496/5980; CRM Unit Capacity values being knocked off following Registration import due to overlapping date ranges.

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
		• One was due to an error in recording Registration data for one unit.	The defect is currently in Analysis, resolution date to be confirmed. In the interim a manual work around has been implemented. • The error in recording Registration data was resolved from 08/01/2020 and will be corrected via resettlement.
Section F.19	• For a randomly selected sample of 4 days during the testing period where the monthly strike price (PSTR) has been exceeded by either the imbalance price (PIMB), an intraday trade price (PTID) or day-ahead trade price (PTDA). Obtain all input data required (Metered Quantity, Difference Payment Parameters, Capacity Charge Parameters) to calculate the Total Difference Payment (CDIFFPTOT) for a given unit. Recalculate Difference Payment Charge, based on the market code (F.19) for all units for the selected dates and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent resettlement runs performed during the testing period.	The following dates were randomly selected where the monthly strike price was exceeded by PIMB, PTID or PTDA: • 3 October 2018 • 9 October 2018 • 23 November 2018 • 24 January 2019 The required input data was obtained and used to recalculate CDIFFPTOT for each unit. No differences over 1% were identified.	-

3.4 Currency and Balancing Charges

A known defect exists affecting SEMO's ability to provide the required data. The defect, 117257 / 6031 prevents access of MPI information before the participant registration date. This affects between one and three participants across all testing dates. In these cases the underlying settlement data was obtained directly from SEMO.

Unless otherwise stated the following dates and settlement runs were selected for testing:
- 21 December 2018 (Initial and M+4 settlement)
- 8 March 2019 (Initial and M+4 settlement)
- 24 April 2019 (Initial and M+4 settlement)
- 15 November 2019 (Initial settlement)

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section F.14, F.15	• For a sample of 4 days during the testing period, chosen to test between major software releases, obtain all input data required (Registration Data, Metered quantity, Currency Charge Parameters) to calculate the Currency Adjustment Charge (CCA) for a given unit. Recalculate Currency Adjustment Charge, based on the market code (F.15) and record any difference to the value obtained by SEMO. Document SEMO's response to any differences over 1%. For each day tested within the period, recalculate for the initial run and any subsequent resettlement runs.	For the selected testing dates the required input data was obtained, the CCA recalculated for each unit and settlement period and compared to the SEMO reported values. 857 Differences were noted in 21 December 2018 D+4 testing. All differences were where SEM calculated a zero value for non Trading Site Supplier Units where it should not be have zero as per the definition of the calculation, detailed in TSC Part B F.15.3. This has been confirmed by SEMO as a known defect. No differences were observed in 21 December 2018 M+4 testing.	As part of testing for 21 December, differences were noted that relate to a defect by which SEMO was incorrectly calculating as zero for CCA for non Trading Site Supplier Units. This defect fix was in test on the testing date (21 December 2018) and was deployed to production on 28 January 2019. The relevant correction was included in resettlement. Fixed as part of defect 5710 and resettled in M4 already for period in question.

3.5 Credit Cover Management

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section G.9-15, Agreed Procedure 9	• Document the Credit Cover Management process, implemented by SEMO, to implement the requirements of with section G.9 – G.15 of the Code as well as AP 9. • Obtain a list of all instances where the required credit cover of a participant, exceeded the posted credit cover. Select a sample of 5 instances and document what notices were issued to these participants. • For a sample of 5 new unit registrations selected in Accession and Registration testing, document the requirements in terms of adjusted Participant Cover as set out in AP9. • For a sample of 2 Credit Cover providers, record what ongoing monitoring, as set out by AP 9 and the Code were performed. Document SEMO's explanation for any discrepancies. • For a sample of 2 Participants for which changes to Posted Credit Cover occurred, other than changes to letters of credits or new letter of credit, record if each of the steps of section 3.4 of AP 9 were performed. • For a sample of 5 transfers from the collateral reserve account document the requirements in respect of transfers from the SEM Collateral Reserve Account (including request for transfers), as set out by AP 9 and the Code. • Inspect the RCC calculation configuration of the Credit Risk Management System and document against each element of with Section 2.3 of AP9. Select a sample participant and re-perform the calculation of the RCC based on the factors indicated in the code and record if it matched	• Walkthrough of the Credit Cover Management process implemented by SEMO was performed. • Sample testing was completed in accordance with the Agreed Upon Procedures set out. • For the sample of instances where required credit cover exceed the posted credit cover, new unit registrations, changes of credit cover, transfer from the collateral reserve account and participant default all steps as set out in the relevant sections of AP9 / paragraph B.18 were performed. • For the two credit cover providers samples no discrepancies were noted. • We performed walkthrough of the RCC calculation configuration within the Credit Risk Management system and confirmed each step against the requirements of AP9. A sample participant was recalculated and the result agreed to the output of the Credit Management System.	-

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
	with RCC value in the Credit Risk Management System. • For a sample of 2 Parties who had defaulted, document the requirements in terms of issuing a default notice and record against paragraph B.18 (part 2 and 3) in the Code.		

3.6 Settlement Queries

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Agreed Procedure 13	• Document an overview of the Settlement Queries process, implemented by SEMO, with the Code as well as AP 13. • For a sample of 5 Settlement Queries, document the requirements as set out by AP 13 and the Code.	• Walkthrough of the Credit Cover Management process implemented by SEMO was performed. • Sample testing was completed in accordance with the Agreed Upon Procedures set out. The following discrepancies were noted: • The Market Operator does not communicate the method used to estimate materiality. [AP 13/3/22] From discussions with the Market Operator the method is communicated only if the raising party specifically requests the method. • No dedicated/ad-hoc Settlement Reruns have been scheduled from March 2019, because of the defects in the Settlement System. The dedicated resettlement activity continued through Timetabled Settlement Reruns M+4 and M+13.	The method used to determine materiality is as per TSC Calculations, applying the revised/corrected data to the calculation. Determination as per G.3.2.10 is either High or Low Materiality. The Market Operator expects to perform dedicated/ad-hoc Settlement Reruns to resettle all the delayed resettlements following the Release E of the ABB's Settlement Software, which is expected to be deployed in April 2020, and also following the completion of the M+4 catch-up processing which is due to complete towards the end of June 2020. This was communicated to market participants at the Market Operator User Group (MOUG) on 16 January 2020. A further update on the re-settlement approach to ad-hoc resettlement was discussed as a special topic with market participants at the Market Operator User Group (MOUG) on 27 February 2020.

3.7 Modifications/Code Development

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section B.17, Agreed Procedure 12	• Document an overview of the Code Modifications process, implemented by SEMO against the Code as well as AP 12. • For a sample of 2 Modifications made or proposed during the testing period document if each step of section B.17 and AP 12 was completed.	• Walkthrough of the Code Modification process implemented by SEMO was performed. • Sample testing was completed in accordance with the Agreed Upon Procedures set out. For the two modifications sampled all required steps of section B.17 / AP12 were completed.	-

3.8 Information publication

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section C.7, Agreed Procedure 6	• Document an overview of the process SEMO has put in place to ensure that all data as required by the Code and AP 6 have been published within the timeframes set out by Appendix E of the code. • Document if SEMO published the latest version of the code as well as related updates, against the timelines as set out in the Code.	• Walkthrough of the Credit Cover Management process implemented by SEMO was performed. • The Market Operator published the current, effective version of the Code once on April 18th, 2019. (timing request: "The Market Operator shall publish the current, effective version of the Code no less frequently than twice yearly in line with the Scheduled Release") [B.28.1.1 / Appendix E: Data Publication]	The decision not to publish two Code versions during the year was taken via close liaison with, and the agreement of, the Modifications Committee, including the Regulatory Authorities members on the committee. While there were system releases in 2019, there were not twice yearly Scheduled Releases to update the Central Market Systems so that it was not possible to publish Code versions aligned to these. As this was a stabilisation phase of the new arrangements, system releases were necessarily delivered as required in response to identified defects so that the delivery of changes to the Central Market Systems was more frequent than under a twice yearly 'business as usual' scenario.

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
			Along with this, the volume of Code Modifications was also elevated as the rules also were developed in response to identified issues in the early stages of I-SEM. This meant that it was necessary to take a pragmatic approach to managing Code updates taking into consideration when batches of Modifications became effective following SEM Committee decisions, the volume of ongoing Modifications work and acknowledging that it would not be possible to align these to system releases. As such, the SEMO Modifications team worked closely with Participant representatives on the Modifications Committee and the Regulatory Authorities agree the most appropriate timing for the publication of any updates.

Both system and rules development programmes have gradually moved towards 'business as usual' approaches as the I-SEM arrangements have matured so that it is anticipated that a twice yearly frequency will be in place going forward.- |

3.9 Communication channels

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section C.2, Agreed Procedure 3	• Document an overview of the process involved in qualifying Communication Channels in terms of AP 3 and the Code. • For a sample of 20 parties registered to the Market, record if all Digital Certificates have been issued to parties of the Market, as required by AP 3 and the Code. • For a sample of 5 parties registered to the Market, record if all requirements for Qualification Testing of Communication Channels (type 2 and type 3), as set out by AP 3 and the Code were performed by SEMO. • For a sample of 2 parties who have been suspended from using type 2 or type 3 Channels, by SEMO, document if all requirements of the suspension process were performed by SEMO, as set out by AP 3 and the Code.	• Walkthrough of the process to qualify Communication Channels implemented by SEMO was performed. • Sample testing of 20 participants was completed as set out in the Agreed Upon Procedure. For all samples the required steps per AP3 had been completed. • Only three instances of Qualification Testing for Communication Channels occurred during the testing period. All three instances were sampled and it was confirmed all required steps per AP3 had been completed. • There were no instances of parties being suspended from using type 2 or 3 channels during the period hence no testing was performed. .	-

3.10 Communication and System Failures

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section C.5, Agreed Procedure 7	• Document an overview of the process involved in Emergency Communications and General System Failures in terms of AP 7 and the Code. • For a sample of up to 2 general system and/or general communication failures, document against the requirements as set out by AP 7 and the code.	• Walkthrough of the process in respect of Emergency Communications and General System Failures implemented by SEMO was performed. • Sample testing was completed as set out in the Agreed Upon Procedure. All required steps as set out by AP7 were followed for the sampled failures.	-

3.11 Transaction Submission and Validation

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Agreed Procedure 4	• For the validated Technical Offer Data obtained under section 'Settlement Production' above, record if the data is consistent with the validation requirements as set out by AP 4 and the code. Document explanations from SEMO for any exceptions.	• Technical Offer Details used in testing performed under 'Settlement Production' was compared to the validation requirements in AP 4, no exceptions were noted.	-

3.12 Data Storage and IT Security

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Agreed Procedure 5	• For a sample of 10 new and modified user accounts, document against the requirements of AP 5 and the code. • For a sample of 15 leavers, document when their access was removed. • For each user account with privileged access record when SEMO management approved • Obtain and document an overview of how system access by IT / Software Vendors is monitored. For a sample of 5 instances of IT / Software Vendor access record each step of the documented process. • Record the design and implementation of offline electronic backup solution against AP 5 and the code.	• Sample testing was completed as set out in the Agreed Upon Procedure. • The following exceptions were identified: a) For one out of ten sampled new and modified user accounts, we have identified that access was granted without manager approval. b) For one out of 15 sampled leavers, we have identified that the leaver's Windows AD account was not timely removed. The last login date of the leaver was after the termination date. c) In performing the agreed upon procedure over privileged user accounts, we have identified that one user account retained privileged access to iSEM CSB after changing to a role for which this access was not required. This was removed when identified during our testing. d) No active monitoring of vendor activities is in place for the in-scope applications.	a) This identified user was in a support role in preparation for go-live. b) The process relating to movers/leavers/joiners and its requirements has been re-communicated within Market Operations. We believe that this issue [last login date] was caused by an application defect & is under investigation. c) Internal process has been amended and updated. Currently under review with available options being considered. d) Currently under review with available options being considered.

3.13 Systems and operations

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Agreed Procedure 11	• Document an overview of the process involved in Systems Operation, Testing, Upgrading and Support document in terms of AP 11 and the Code. • For a sample of 2 change releases and 10 bug fixes, document against AP 11 and the code. • For a sample of 2 amended authorised persons, document against AP 11 and the code. • Record when annual confirmation of authorised persons was completed.	• Walkthrough of the process in respect of Systems Operation, Testing, Upgrading and Support implemented by SEMO was performed. • Sample testing was completed as set out in the Agreed Upon Procedure. • For three out of ten sampled bug fixes, we have identified that retrospective CAB approval were not obtained.	The flow for emergency changes is for the change to be implemented and the ticket set to "Complete" following implementation. Once the change is made, there is a subsequent step to get CAB approval and once that is received, the ticket is then set to "Closed". These 3 tickets were mistakenly set to "Closed" and not "Complete" which meant that these tickets never received CAB approval retrospectively. As a remedial step, training is currently taking place to review and re-iterate the Change Management Process (attached) with all the teams who deal with such changes. This has been completed with WSO/Corp Apps teams and will be completed with the remaining teams before the end of February.

3.14 Legacy SEM Resettlement

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section A	• For settlement dates previously tested in the testing period ending 30 September 2018 obtain updated metering data, participant information reports, settlement statements and settlement invoices for resettlement runs performed during the period 1 October 2018 – 31 December 2019.	The required data was obtained for the following dates previously tested: • 19 September 2017 (M+13) • 2 April 2018 (M+13) • 23 August 2018 (M+4 and M+13)	-

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
	Recalculate the resettlement of the following charges/payments and compare to SEMO calculated values: o Energy Charge and Payments o Capacity Charge and Payments o Uninstructed Imbalances o Any other charges/payments affected by previously reported issues Document SEMO's response to any differences over 1%.	The specified calculations were reperformed and compared to SEMO reported values. No exceptions were noted for any of the dates tested and the differences previously identified in the D+4/M+4 testing of Loss of Load Probability for 19 September 2017 have now been corrected in SEMO results.	

3.15 Transitional Arrangements

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
Section C	• Compare the participant register from the [legacy] SEM and new SEM arrangements. Identify any participants in the new arrangements valid on the Amendment Date that were not present in the [legacy] SEM and document SEMO's explanation for how these participants were registered. • Document the transitional process published by SEMO per section 5 including key checks/reconciliations performed by SEMO. For a sample of 5 units subject to transition document the process. Compare the registration data subject to migration between the [legacy] and new SEM systems and record any discrepancies. Document explanations from SEMO for any discrepancies found. • Obtain a copy of SEMOs "Lessons Learnt" / "Project Closure" report from the transition to I-SEM. Document the key inputs to the report including stakeholders who provided input from within SEMO and wider market.	• The participant register from the legacy and new SEM arrangements was obtained and compared as set out in the Agreed Upon Procedure. No participants in the new arrangements valid on the Amendment Date were identified that were not present in the [legacy] SEM register. • A copy of the transition process published by SEMO was obtained and the process steps identified. For a sample of units as set out in the Agreed Upon procedure we confirmed each step had been performed. We identified that no Commencement Notices have been issued for units that transitioned or went effective at the Go-Live. The Transitional Registration Plan (published by SEMO per TSC Part C, section 5 (1.10.3) states "A Commencement Notice is issued by the Market Operator to a Participant officially confirming that a Unit has met all pre-requisites and can trade in the I-SEM from the effective date specified in the Notice".	Commencement Notices were not issued as part of the transitional arrangements as all units went effective when the market went live.

Relevant TSC Section(s)	Agreed Upon Procedure	Work Performed and Factual Findings	SEMO Response
	• For each major recommendation / change proposed in the Lessons Learnt report inspect documentation of relevant SEMO Processes and project plans/documentation for current Market System stabilisation activity and document if these have been updated to reflect the recommendations.	• A lessons learnt report was completed in December 2018. A copy of the report was obtained and examined as required in the Agreed Upon Procedure. The report was based on interviews and workshops with all teams within SEMO, including the external Client Side Advisory team who were part of the project. • Fourteen key themes were identified in the report covering areas of Governance, People, Programme, Testing and Vendors. Of these seven are not relevant/applicable for the stabilisation phase but rather relate to items for future similar projects. The remaining seven have been applied to the stabilisation phase and/or business as usual activities where appropriate.	

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