

Verification Report

Report for:

AvalonBay Communities Inc.

LRQA reference:	UQA00000422
Verification dates:	April - July, 2020
Verification location:	Remote
Verification criteria:	WRI/WBCSD GHG Protocol (reporting), ISO 14064-3 & LRQA's Verification Approach (verification)
Verification team:	Derek Markolf – Lead Verifier
LRQA Client Facing Office:	Houston

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Attachments
N/A

This report was presented to and accepted by:
Name: Mark Delisi
Job Title: Sr. Director of Corporate Responsibility

1. Executive report

Verification outcome:

LRQA, Inc. (LRQA), a member of the Lloyd's Register group of entities, was contracted by AvalonBay Communities Inc. (AvalonBay) to verify its Scope 1 (direct emission), Scope 2 (energy indirect emissions), and Scope 3 (other indirect) greenhouse gas (GHG) emissions; energy consumption for Scope 1 and Scope 2; waste generation and water consumption for calendar year 2019 (CY 2019). The Scope 3 emissions verified by LRQA were limited to emissions from business travel and employee commuting.

Water consumption and waste generation data verified by LRQA did not include data from AvalonBay construction operations. This is in alignment with the Global Real Estate Sustainability Benchmark (GRESB) Guidance document.

The verification was conducted to a limited level of assurance and at a materiality level based on the professional judgment of the verifier. The final quantities verified are as follows:

Item	Quantity	Units
Scope 1 Emissions	22,146	MT CO ₂ e
Scope 2 Emissions Location-Based	58,531	MT CO ₂ e
Scope 2 Emissions Market-Based	58,531	MT CO ₂ e
Scope 3 Emissions (business travel)	202	MT CO ₂ e
Scope 3 Emissions (employee commuting)	5,667	MT CO ₂ e
Total Scope 1 Energy	121,790	MWh
Total Scope 2 Energy	198,252	MWh
Water Consumption (Communities only) ¹	11,504,326	M ³
Subset of Waste Generated (Communities only) ^{2,3}	92,258	MT

1. Water consumption does not include water consumed by the AvalonBay construction division.
2. Waste generation does not include waste generated by the AvalonBay construction division.
3. Waste generation data is only representative of 92% of AvalonBay communities.

AvalonBay excluded refrigerant emissions from HVAC systems and combustion of diesel fuel in emergency generators.

Based on LRQA's approach, nothing has come to our attention that would cause us to believe that the total Scope 1, Scope 2, and Scope 3 GHG emissions, and Environmental Data disclosed by AvalonBay in the Reports for CY 2019, as summarized in Table 1 below, are not materially correct and that the GHG Emissions Inventory and Environmental Data Assertion have not been prepared in conformance with the WRI/WBCSD GHG Protocol, the 2019 GRESB Real Estate Reference Guide, and AvalonBay environmental data management processes.

LRQA confirms that the contents of this report, together with any evidence or notes taken during this verification will be treated in the strictest confidence and will not be disclosed to any third party, without the prior consent of the client, except as required by the accreditation authorities.

Areas for senior management attention:

The CDP wording of the following line item descriptor in table C8.2a of the CDP Report is a bit vague, and does not make any reference to whether or not the renewable attributes conveyed in RECs are still intact:

“Consumption of self-generated non-fuel renewable energy”

That said, without any footnotes explaining the RECs related to this power have been sold, it could be considered misleading to the intended users of the CDP Report to include AvalonBay's consumption of the brown power remaining after the RECs have been sold.

2. Verification summary

Visit objective

This report records the outcome of the LRQA verification of Greenhouse Gas (GHG) emissions and environmental data parameters for AvalonBay conducted in April to July 2020.

Introduction

The verification activities were conducted by Derek Markolf, Lead Verifier for LRQA with assistance from other LRQA staff where appropriate. This report includes the outcome of LRQA verification activities for the following data:

- Scope 1 and 2 greenhouse gas (GHG) emissions
- Scope 3 GHG emissions from business travel and employee commuting
- Energy inventory – Scope 1 Total Energy (consumptions of natural gas, propane and fuel oil) and Scope 2 Total Energy (consumption of electricity and steam).
- Water consumption
- Waste generation

The reporting criteria used to evaluate the CY 2019 emissions report was the WBCSD/WRI Greenhouse Gas (GHG) Protocol and the 2019 GRESB Real Estate Reference Guide. LRQA used verification criteria from ISO 14064 Part 3:2006 for the GHG data and LRQA's verification approach for the environmental data to perform the verification.

The Stage 1 verification activities included:

- Initial review and discussions – to confirm scope, objectives, criteria, level of assurance, materiality and their appropriateness for the verification
- Review of the GHG Inventory and systems in place for its derivation
- Strategic Analysis and Risk Analysis
- Verification Planning for Stage 2

The Stage 2 verification activities included:

- Assessment of Criteria Conformance
- Implementation of the data review based on the LRQA sampling plan
- Verification of Data and Information for GHG emissions sources and environmental data sets
- Development of issues log and findings

This report includes a discussion of the items listed above, together with the Verification Schedule, the Verification Plan, and the findings and their resolution.

Grading of Findings

The following definitions apply to the grading of findings in this report:

Misstatement (MIS)

A misstatement (omissions, misrepresentations and errors) in an assertion, data or information that, in the professional judgment of the verifier, is unlikely to affect the decision of the intended user. If such a finding is outstanding at the end of the verification, a positive Assurance Statement will be possible, although qualifications, limitations, and/or recommendations may be included in the Assurance Statement.

<p>Material Misstatement (MMIS)</p>	<p>A misstatement, (omissions, misrepresentations and errors) in an assertion, data, or information that, in the professional judgment of the verifier, could affect the decision of the intended user. If such a finding is left outstanding at the end of the verification then the misstatement must be corrected or a positive Assurance Statement will not be possible.</p>
<p>Non-conformity (NCN)</p>	<p>A nonconformity with the requirements of the assurance criteria (including the terms of engagement) that, in the professional judgment of the verifier, is unlikely to affect the decision of the intended user. If such a finding is outstanding at the end of the verification, a positive Assurance Statement will be possible, although qualifications, limitations, and/or recommendations may be included in the Assurance Statement.</p>
<p>Material Non-conformity (MNCN)</p>	<p>A nonconformity with the requirements of the assurance criteria (including the terms of engagement) that, in the professional judgment of the verifier, could affect the decision of the intended user. If such a finding is left outstanding at the end of the verification then the nonconformity must be corrected or a positive Assurance Statement with regard to the assurance criteria will not be possible.</p>
<p>Opportunity for Improvement (OFI)</p>	<p>An opportunity for improvement is a suggestion from the verifier to improve the operator's performance in monitoring and reporting.</p>
<p>LRQA</p>	<p>A 'follow up' item for the LRQA Verifier to track ongoing issues within the Findings Log where required.</p>

3. Findings Log

1. Grading of the finding *	2. New, Open, Closed	3. Description of the LRQA finding	4. Review by LRQA	5. Process, aspect, department or theme
6. Date of the finding	7. YYMM<Initials>seq.#	8. Clause of the applicable standard		
* MIS = Misstatement MMIS = Material Misstatement NCN = Nonconformity MNCN = Material Nonconformity OFI = Opportunity for Improvement xLRQA = LRQA Follow Up				

Grade 1	Status 2	Finding 3	Correction, root cause & corrective action review 4	Process / aspect 5	Date 6	Reference 7	Clause 8
MIS	Closed	<p>Measurabl: While the Total Scope 1 & Total Scope 2 emissions data in the file entitle "2020-06-02__AvalonBay-Communities__Data-Quality.xls" correlate with the energy star data provided by AvalonBay, the following data categories have large year on year variances and do not correlate with energy star data:</p> <ul style="list-style-type: none"> - Total Energy (kWh) - Total Electricity (kWh) - Renewable Electricity (kWh) - Total Fuel (kWh) - District Heat & Cooling (kWh) <p>Please provide a revised Measurabl Data Quality file to assist with verification of the total energy line item.</p>	Measurabl provided a revised Data Quality Report with correct data to support the GHG emissions inventory.	Energy Data	6/2/2020	2006DM01	Accuracy
Clarification Request	Closed	<p>The following properties listed with the New Construction life cycle phase in file entitled "2020-06-02__AvalonBay-Communities__Data-Quality.xls" include waste and water data in the Property Trends tab:</p> <ul style="list-style-type: none"> - WA031_AVA Esterra Park - MA054_Avalon Sudbury <p>NJ031_Avalon Piscataway</p>	Measurabl confirmed these are scrubbed out when the reports are generated.	Waste	6/9/2020	2006DM02	Accuracy
Clarification Request	Closed	<p>The following properties listed with the operational life cycle phase in the file entitled "2020-06-02__AvalonBay-Communities__Data-Quality.xls" include either very little or no Scope 1 Energy and GHG emissions data:</p> <ul style="list-style-type: none"> - MD026_Avalon Fairway Hills – Meadows - WA539_Archstone Redmond Lakeview - NJ007_Avalon at Edgewater - MD007_Eaves Washingtonian Center 2 	AvalonBay confirmed that each of these are either all or primarily electric communities.	Scope 1 Energy & GHG Emissions	6/8/2020	2006DM03	Accuracy

Grade 1	Status 2	Finding 3	Correction, root cause & corrective action review 4	Process / aspect 5	Date 6	Reference 7	Clause 8
		<ul style="list-style-type: none"> - MD012_Eaves Columbia Town Center 2 - NY033_Avalon Garden City - NJ019_Avalon at Wesmont Station II - NY009_The Avalon - CA005_Avalon Campbell - WA014_AVA Belltown - WA018_Avalon Meydenbauer - VA029_Avalon Park Crest - VA030_Eaves Fairfax Towers - NJ006_Avalon Princeton Junction - MA041_Avalon Prudential Center 2 - MA042_Avalon Prudential Center 1 - TX527_Archstone Lexington - TX539_Archstone Toscano - TX540_Memorial Heights Villages <p>Please explain why there is little to no Scope 1 energy and GHG emissions reported for each of these properties.</p>					
MIS	Closed	<p>The GRESB report states the residential waste coverage is 92.48% while the file entitled "2019 AvalonBay Waste Data for LRQA Review FINAL" states 91% coverage.</p> <p>Please explain how the GRESB coverage is calculated, and why there is a discrepancy in the two reports.</p>	<p>Measurabl confirmed their coverage data is most accurate, and provided an explanation of how it is calculated.</p> <p>AvalonBay updated their documentation accordingly.</p>	Waste Coverage	6/9/2020	2006DM04	Accuracy
MIS	Closed	<p>When comparing the previous CDP and GRESB reports (6/9/2020) with the current versions (7/1/2020), LR noted the following changed to the reported data:</p> <ul style="list-style-type: none"> - Scope 2 emissions (MT): 58,261 (7/1), 62,249 (6/2) - Scope 2 energy (MWh): 197,423 (7/1), 213,209 (6/2) <p>Total Waste (MT): 92,258 (7/1), 86, 215 (6/2) (Note: percent coverage did not change significantly)</p>	<p>For both the Scope 2 emissions and energy, this was due to meters not flowing into the correct scopes in Measurabl originally. Some Scope 3 data that was being coded to Scope 2.</p> <p>For the total waste number, there was an update to 3 communities from Waste</p>	Scope 2 emissions & energy, and Total Waste	7/1/2020	2006DM05	Accuracy

Grade 1	Status 2	Finding 3	Correction, root cause & corrective action review 4	Process / aspect 5	Date 6	Reference 7	Clause 8
			Management due to a billing error.				
MIS	Closed	<p>When comparing Scope 2 energy consumption in the current CDP report to the supporting records, they do not match:</p> <ul style="list-style-type: none"> - Consumption of purchased or acquired electricity (MWh): 194,836 (CDP Report), 197,423 (2020-07-01__AvalonBay-Communities__CDP-Scope-2.xlsx) - Consumption of purchased or acquired steam (MWh): 2,587 (CDP Report), 16,961 (2020-07-01__AvalonBay-Communities__Data-Quality-LR.xlsx) <p>Renewable Electricity (MWh): 941 (CDP Report & supporting records matched)</p>	<p>AvalonBay was able to explain the reasons for these differences. This variance was the steam component. 16,961 in the D&Q report includes Scope 3 data.</p>	Scope 2 Energy	7/2/2020	2006DM06	Accuracy
MIS	Closed	<p>As Avalon Bay is selling the RECs associated with the Renewable Electricity Consumption reported to CDP (941 MWh), the GHG emissions resulting from consumption of this electricity should be included in the GHG emissions inventory. Based on a comparison of data in the following two files, it appears as if these GHG emissions are not included in the CDP Report.</p> <ul style="list-style-type: none"> - 2019 Energy Data with Emissions.xlsx (AvalonBay file) - 2020-07-01__AvalonBay-Communities__CDP-Scope-2 (Measurabl file) 	<p>AvalonBay was coding the sold RECs appropriately in their report to Energy Star, but the coding was not transferring correctly to Measurabl. AvalonBay worked with Measurabl to correct the coding in the Measurabl system. LR confirmed the updates were appropriate.</p>	Renewable Electricity	7/2/2020	2006DM07	Accuracy
OFI	Open	<p>The CDP wording of the following line item descriptor in table C8.2a of the CDP Report is a bit vague, and does not make any reference to whether or not the renewable attributes conveyed in RECs are still intact:</p> <p>“Consumption of self-generated non-fuel renewable energy”</p> <p>That said, without any footnotes explaining the RECs related to this power have been sold, it could be considered misleading to the intended users of the CDP Report to include AvalonBay’s consumption of the brown power remaining after the RECs have been sold.</p>	<p>Measurabl decided not to make any changes to this year’s reporting. This will not be included in the ASt.</p>	Renewable Electricity	7/2/2020	2006DM08	Accuracy



Verifier: Derek Markolf

Verification of:	Terms of Engagement - Contract Conditions Confirmation	Auditee(s):	Mark Delisi and Kevin Mulcahy
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Audit trails and sources of evidence:

Contract Condition Confirmation

Evaluation and conclusions:

Scope: Data Verification of the following items:

- Scope 1 (direct) GHG emissions: natural gas, fuel oil, and propane (operational control)
- Scope 2 (indirect) GHG emissions: purchased electricity and steam (operational control)
- Scope 3 (Other indirect) GHG emissions: business travel
- Scope 3 (other indirect) GHG emissions: employee commuting
- Energy Consumption:
 - Scope 1: total MWh (operational control)
 - Scope 2: total MWh (operational control)
- Water consumption (financial control)
- Waste generation (financial control)

Objectives: Verification of AvalonBay's GHG emissions, energy consumption, water consumption and waste generation for CY 2019. The verification is intended to provide AvalonBay with an independent opinion on the completeness and accuracy of the data provided.

Criteria:

- World Resource Institute / World Business Council for Sustainable Development (WRI/WBCSD) GHG Protocol;
- 2019 GRESB Real Estate Reference Guide;
- Verification protocol follows ISO 14064-3: Specification with guidance for validation and verification of greenhouse gas assertions and LRQA verification approach
- AvalonBay GHG Emissions and Environmental Data Inventory Management Plan v5, and supporting policies and procedures

Level of Assurance: Limited Assurance

Materiality: Qualitative materiality based on the professional judgment of the verifier

Changes to Terms of Engagement: None

In completing this report, the LRQA verifiers confirm their independence from the client and that there was no known conflict of interest during the engagement.

Verification of:	Strategic Analysis and Risk Analysis (SARA)	Auditee(s):	Mark Delisi, and Kevin Mulcahy
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Strategic Analysis:

Through the Strategic Analysis, the Verifier determined the significance of the items of information and data to be verified. This judgement of significance is based on the nature and scale of the information and data as they relate to the scheme requirements.

Information or Data Source	Significance	Basis of Significance
Natural gas	M	Accounts for ~22% of Scope 1&2 GHG emissions
Fuel oil	L	Accounts for <1% of Scope 1&2 GHG emissions
Propane	L	Accounts for <1% of Scope 1&2 GHG emissions
Electricity	H	Accounts for ~76% of Scope 1&2 GHG emissions
Steam	L	Accounts for 1% of Scope 1&2 GHG emissions
Scope 3 business travel - air	M	Accounts for 5% of Scope 3 GHG emissions
Scope 3 business travel - car	L	Accounts for <1% of Scope 3 GHG emissions
Scope 3 business travel - hotel	L	Accounts for <1% of Scope 3 GHG emissions
Scope 3 employee commuting	H	Accounts for 94% of Scope 3 GHG emissions

NOTE: Much of the environmental data to be verified are activity data for the GHG emissions quantification, so the above Strategic Analysis is also applicable to this data.

Each of the environmental data parameters included in the Environmental Data Assertion was assessed separately for materiality.

Information or Data Source	Significance	Basis of Significance
Water Consumption	H	Separate materiality for each environmental data parameter leads to each being highly significant.
Waste Generation	H	Separate materiality for each environmental data parameter leads to each being highly significant.

Risk Analysis:

Through the Risk Analysis, the Verifier determined the potential risk of an omission, misrepresentation or error in relation to information and data sources. This determination included, but was not necessarily limited to, a judgement based on:

- the inherent risk associated with the data / information management
- the level of control applied to the data / information management
- the control of monitoring and metering used to gather data
- the number of personnel involved in the data management, their competence, attitude, and commitment.

Information or Data Source	Significance	Data Gathering	Measuring Equipment	People	OVERALL RISK
Natural gas	M	L	L	L	M
Fuel oil	L	L	M	L	L
Propane	L	L	M	L	L
Electricity	H	L	L	L	M
Steam	L	M	L	L	L
Scope 3 business travel - air	M	M	L	L	M
Scope 3 business travel - car	L	M	L	L	L
Scope 3 business travel - hotel	L	M	L	L	L
Scope 3 employee commuting	H	M	M	L	M

NOTE: The energy data to be verified are activity data for the GHG emissions quantification, so the above Risk Analysis is also applicable to this data.

Information or Data Source	Significance	Data Gathering	Measuring Equipment	People	OVERALL RISK
Water Consumption	H	L	L	L	M
Waste Generation	H	M	M	L	M

Client note: Generally, the outputs of the Risk Analysis influence the Verification Plan to manage the risk of LRQA detecting omissions, misrepresentations and errors in the following way:

High Overall Risk – detailed verification and data sampling

Medium Overall Risk – verification and data sampling to a lesser extent than High Overall Risk

Low Overall Risk – limited verification, simple checks only.

The Verifier will manage the degree of sampling through their Data and Information Sampling Plan.

Verification Planning:

As a result of the completion of the Strategic Analysis and Risk Analysis, a Verification Plan was developed. The Verification Plan, included in Section 5, defines the key elements of the verification and when those elements will be covered. The Verification Plan is supported by a Data / Information Sampling Plan which defines all the specific items of data and information which the Verification Team has identified as relevant and the depth to which relevant data is to be verified.

The following changes to the original Verification Plan / Data and Information Sampling Plan took place:
The original schedule for the verification plan was delayed.

Verification of:	Criteria Conformance	Auditee(s):	Mark Delisi Kevin Mulcahy Eric Abramson (Measurabl)
<p>Audit trails and sources of evidence:</p> <p>Discussions with corporate representatives Discussions with Measurabl representative overseeing AvalonBay data management within Measurabl platform. Overview of AvalonBay utility bill management through their third party services (Cass) Careful review of reporting boundaries with AvalonBay representatives GHG Emissions and Environmental Data Inventory Management Plan v5</p> <p>Evaluation and conclusions:</p> <p>No findings were raised related to conformance with criteria.</p> <p>One opportunity for improvement was added, which was related to the approach to reporting “renewable energy” consumption in the CDP report. See finding 2006DM08 in the findings log for more details.</p>			

Verification of:	Data & Information Verification	Auditee(s):	Mark Delisi Kevin Mulcahy Eric Abramson (Measurabl)
<p>Audit trails and sources of evidence:</p> <p>Measurabl CDP and GRESB reports with final data to be verified Measurabl Data Quality Report 2018–19 Scope of activity data, references for EFs and GWPs, conversion factors, and calculation methodologies within Measurabl software. Utility bill (NG, electricity and water) data downloads from Cass AVB GRESB Data Check 2019_Apr22 (1)-LR 2019 Energy Data with Emissions-LR.xls 2019 Water Data-LR.xls 2019 AvalonBay Waste Data for LRQA Review FINAL v2-LR AvalonBay Scope 3 Travel & Commuting Emissions Data Summary (6_April_2020)_ALL DATA-LR Commuting Scope 3 Calculation AVB 2019 2020-07-01__AvalonBay-Communities__Data-Quality + multiple previous versions of DQR 2020-07-01__AvalonBay-Communities__CDP-Scope-1-LR + multiple previous versions 2020-07-07__AvalonBay-Communities__CDP-Scope-2-LR + multiple previous versions</p>			

Evaluation and conclusions:

The revised Verification Plan and Data Sampling / Evidence Gathering Plan were followed to completion.

AvalonBay utilised a cloud-based climate change and sustainability data management and reporting platform called Measurabl that caters primarily to the real estate sector. The two reports generated by Measurabl for AvalonBay are the CDP report and the GRESB report, both of which are intended to be uploaded directly to the CDP and GRESB in the form of completed questionnaires.

AvalonBay populates energy and water data for each of their 280 communities in the US EPA Energy Star platform. Measruabl is then populated by a direct automated transfer of data from Energy Star to Measurabl. For waste data, waste generation is transferred from Waste Management directly into Measurabl.

Scope 1, Scope 2 and Scope 3 GHG Emissions:

A high-level review of Measurabl energy data and GHG emissions data reported to CDP and GRESB was performed to identify areas where the data differs. LRQA noted numerous differences and was then informed of the unique reporting criteria that GRESB has and how it differs from standard GHG emissions accounting principles.

The raw utility bill data for natural gas and electricity was checked against final data reported in Measruabl for a representative sample of facilities. During this check the emissions factors for natural gas combustion and electricity grid factors were checked for accuracy.

AvalonBay reported both location-based and market-based Scope 2 emissions. For market-based emissions, AvalonBay has opted to utilise the lowest tier on the GHG Protocol Scope 2 Guidance market-based hierarchy, which results in the same Scope 2 emissions data being reported for both location-based and market-based methods. See the sampling plan for details of the analysis performed on the Scope 2 data.

Four findings were raised related to Energy, and Scope 1 & Scope 2 emissions data, which were closed. See the findings log for details and resolution.

AvalonBay uses a third-party travel service to book all travel and one of the services provided by the booking company is to track Scope 3 GHG emissions for AvalonBay and provide reports of the emissions upon request. AvalonBay received a report for CY 2019 Scope 3 emissions from air travel, car travel and hotel room occupancy. LRQA sampled the data Scope 3 air travel data per the sampling plan. No errors were noted in the execution of the functions in the travel services database.

Scope 3 GHG emissions from employee commuting was reported per the AvalonBay Commuting Scope 3 Calculation methodology provided to LRQA in a word document. LRQA confirmed the databases and calculations used for derivation of employee numbers and their distance from workplace were appropriate. Also, the assumptions made for emissions calculations were checked and considered appropriate.

No findings were raised related Scope 3 emissions.

Verification of environmental data parameters included in Environmental Data Assertion:

The energy data reported by AvalonBay are closely related to GHG activity data. LRQA performed checks against the Measurabl GHG emissions reports to confirm all environmental data being verified was consistent with verified GHG emissions activity data.

For the other environmental data parameters related to water consumption and waste generation, LRQA gained an understanding of the processes and procedures in place through interviews with AvalonBay personnel whom oversee the respective data management systems. Key files from the system were sampled, and data was tracked from source to sink (Measurabl).

LRQA was only contracted to verify waste generation related to a subset of the AvalonBay communities (92%). LRQA verified the percentage of communities represented and will include clear documentation of the scope of the verification in the assurance statement. Also, the boundaries for AvalonBay waste and water data exclude waste and water data related to construction activities. This is in alignment with the GRESB reporting guidelines.

Two findings were raised related to waste data, which were both closed. See the findings log for details and resolution.

Verification of:	Errors and Corrections	Auditee(s):	Mark Delisi Kevin Mulcahy Eric Abramson (Measurabl)
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Audit trails and sources of evidence:

2020-07-07__AvalonBay-Communities__CDP-Word
 2020-07-07__AvalonBay-Communities__GRESB-Word
 AvalonBay Scope 3 Travel & Commuting Emissions Data Summary (6_April_2020)_ALL DATA-LR
 Commuting Scope 3 Calculation AVB 2019
 AvalonBay - CY19 Workbook
 2020-07-01__AvalonBay-Communities__Data-Quality + multiple previous versions of DQR
 2020-07-01__AvalonBay-Communities__CDP-Scope-1-LR + multiple previous versions
 2020-07-07__AvalonBay-Communities__CDP-Scope-2-LR + multiple previous versions

Evaluation and conclusions:

During the verification activities AvalonBay provided clarification regarding discrepancies noted by LRQA between various data sources. LRQA confirmed that appropriate amendments were made to the GHG emissions inventory and the environmental data assertion.

Verification of:	Materiality Conclusion	Auditee(s):	Mark Delisi Kevin Mulcahy Eric Abramson (Measurabl)
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Audit trails and sources of evidence:

2020-07-07__AvalonBay-Communities__CDP-Word
 2020-07-07__AvalonBay-Communities__GRESB-Word
 AvalonBay Scope 3 Travel & Commuting Emissions Data Summary (6_April_2020)_ALL DATA-LR
 Commuting Scope 3 Calculation AVB 2019
 AvalonBay - CY19 Workbook
 2020-07-01__AvalonBay-Communities__Data-Quality + multiple previous versions of DQR
 2020-07-01__AvalonBay-Communities__CDP-Scope-1-LR + multiple previous versions
 2020-07-07__AvalonBay-Communities__CDP-Scope-2-LR + multiple previous versions

Evaluation and conclusions:

Based on LRQA's approach, nothing has come to our attention that would cause us to believe that the total Scope 1, Scope 2, and Scope 3 GHG emissions, and Environmental Data disclosed by AvalonBay in the Reports for CY 2019 are not materially correct and that the GHG Emissions Inventory and Environmental Data Assertion have not been prepared in conformance with the WRI/WBCSD GHG Protocol, the 2019 GRESB Real Estate Reference Guide, and AvalonBay environmental data management processes.

Evidence list:

-  2019 AvalonBay Waste Data for LRQA Review FINAL v2-LR.xlsx
-  2019 Energy Data with Emissions-LR.xlsx
-  2019 Water Data-LR.xlsx
-  2020-06-02_AvalonBay-Communities_CDP-Scope-1-LR.xlsx
-  2020-06-02_AvalonBay-Communities_CDP-Scope-2-LR.xlsx
-  2020-06-02_AvalonBay-Communities_Data-Quality-LR.xlsx
-  2020-06-16_AvalonBay-Communities_Data-Quality-LR.xlsx
-  2020-07-01_AvalonBay-Communities_CDP-Scope-1-LR.xlsx
-  2020-07-01_AvalonBay-Communities_CDP-Scope-2-LR.xlsx
-  2020-07-01_AvalonBay-Communities_Data-Quality-LR.xlsx
-  2020-07-07_AvalonBay-Communities_CDP-Scope-2-LR.xlsx
-  AvalonBay Scope 3 Travel & Commuting Emissions Data Summary (6_April_2020)_ALL D.
-  Commuting Scope 3 Calculation AVB 2019.docx
-  RE Findings.msg
-  AvalonBay - CY19 Workbook.xlsx
-  2019 Construction Utilities.xlsx
-  2019 Energy Data with Emissions.xlsx
-  2019 Energy Data with Emissions-DM.xlsx
-  2019 LFL Communities v1.xlsx
-  2019 Steam Data.xlsx
-  2019 Vacancy Data.xls
-  2019 Water Data.xlsx
-  Oil Purchase North.pdf
-  Oil Purchase South.pdf
-  Avalon Bay Communities - Car GHG Emissions Report - 2019.pdf
-  Avalon Bay Communities - Hotel GHG Emissions Report - 2019.pdf
-  AvalonBay Scope 3 Travel & Commuting Emissions Data Summary (6_April_2020)_ALL DATA.xlsx
-  Commuting Scope 3 Calculation AVB 2019.docx
-  Scope 3 Employee Commuting and Business Travel Emissions Calculation.msg
-  2019 AvalonBay Waste Data for LRQA Review FINAL.xlsx
-  Diversion Report for 2019 as of 05-2020.xlsm
-  Re Findings.msg
-  Waste File.msg
-  2020-07-07_AvalonBay-Communities_CDP-Word.docx
-  2020-07-07_AvalonBay-Communities_GRESB-Word.docx
-  00000422 SOW CY19 GHG Data.pdf

4. Verification plan

AvalonBay Communities, Inc. Greenhouse Gas Emissions Inventory & Environmental Data, CY 2019 Verification Plan 3/12/2020	
Verification Objectives:	To provide AvalonBay Communities, Inc. (Avalon Bay) with an independent opinion on the completeness of the data and information being submitted to CDP & GRESB.
Verification Criteria:	
Protocols and Standards:	WRI/WBCSD GHG Protocol GRESB 2020 Real Estate Assessment Reference Guide AvalonBay's Environmental Data Management Processes ISO 14064-3 (GHG Verification standard) LRQA Verification Approach - (Environmental data)
Verification Scope:	
Description of Industry/Sources:	REIT which owns, operates, develops and re-develops multi-family communities.
Geographic Boundaries:	North America
Reporting Period:	CY 2019
Data Verified:	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆ , Energy use, Water use, Waste generated
Scopes covered:	Scope 1, 2 and 3. Scope 3 includes business travel and employee commuting only.
Reporting Basis:	Operational Control: GHG Emissions & Energy Financial Control: Water Consumption & Waste Generated
Level of Assurance:	Limited
Materiality Threshold:	
	Professional judgement of the verifier
LRQA Verification Team:	
Lead Verifier:	Derek Markolf
Technical Reviewer (QA/QC):	Heather Moore
Verification Activities and Schedules:	
Scheduled for week of:	Task
March 12, 2020	Kick-Off Meeting
March 30, 2020	Delivery of Scope 3 Business Travel and Employee Commute Reported GHG Emissions and Supporting Spreadsheets
April 6, 2020	Delivery of GHG Inventory, Key Supporting Spreadsheets & Environmental data plan
April 13, 2020	Strategic Review / Risk Assessment
April 13, 2020	Screen Share Meeting & Follow-on Data Request
April 20, 2020	Initial Data submitted to LRQA
April 27 - May 11, 2020	LRQA data verification
May 11, 2020	LRQA Final Review
June 1, 2020	Delivery of Final List of Findings
June 8 - June 22, 2020	Client to address Findings
July 6, 2020	LRQA to conduct internal Technical Review and Assurance Statement Review
July 6, 2020	Delivery of Final Verification Report and Verification Statement

5. Data and Information Sampling Plan

Sampling Code #	Item to be Sampled	Data and Information Requirement (evidence gathering plan)	Lead Verifier Reasoning
01	Scope 2 GHG Emissions & Electricity Use	Check total CY 2019 elect. utility bill data against Measurabl GHG emissions for 30 communities. Divide Measurabl Scope 2 GHG emissions by utility bill electricity use and confirm results in correct eGRID EF.	This will check revenue metered data from utility bills (first tier of data aggregation) against final data in Measurabl used for reporting total GHG emissions (final tier of data aggregation). Will also confirm correct EFs used.
02	Scope 1 GHG Emissions from NG combustion.	Check total CY 2019 NG utility bill data against Measurabl GHG emissions for 30 communities. Divide Measurabl Scope 1 GHG emissions by NG consumption and confirm results in correct EF for NG combustion.	This will check revenue metered data from utility bills (first tier of data aggregation) against final data in Measurabl used for reporting total GHG emissions (final tier of data aggregation). Will also confirm correct EFs used.
03	Scope 3 GHG emissions from business travel (Air, car and hotel)	Obtain copy of calculation methodology for travel emissions and check the line item air travel records against the calculation method to confirm accurate execution of calculations.	Air travel accounts for 5% of the Scope 3 emissions.
04	Scope 3 GHG emissions from employee commutes	Obtain copy of estimation/calculation methodology for employee commute emissions and check pertinent employee records against the calculation method to confirm accurate execution of calculations.	Employee commuting accounts for 94% of Scope 3 emissions, and this is the first year they're reporting these emissions

Sampling Code #	Item to be Sampled	Data and Information Requirement (evidence gathering plan)	Lead Verifier Reasoning
05	Water Data	Check total CY 2019 water utility bill data against Measurabl water consumption for 30 communities.	This will check revenue metered data from utility bills (first tier of data aggregation) against final data in Measurabl used for reporting.
06	Total GHG Emissions calculated in Measurabl	Confirm all GHG emissions source categories are included in Measurabl calculated GHG emissions. Also, check reasoning for all properties with >100% year on year change between CY2018 and CY2019.	High level check of aggregate Scope 1 and Scope 2 activity data against aggregate GHG emissions calculated in Measurabl. YOY change may indicate missing properties.
07	Waste	(1) Confirm Waste Management uploads to Measurabl are complete and accurate through interviews with Measurabl teams and sampling of Waste Management files. (2) Confirm percent coverage of the waste data in Measurabl is accurately calculated.	Waste measured and billed by haulers is relatively straightforward, as the data is straight from the Waste Management billing system.
08	Boundaries	Confirm operational control (GHG emissions) and financial control (water & waste) are accurately applied throughout all communities.	There was some confusion during the CY2015 site visit about application of boundaries. For the most part the boundaries have been straightened out, but still need close attention.