# NWC Tariff Submission for the Period January 2019 to December 2021

## Submission to the Office of Utilities Regulation (OUR)

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# Table of Contents


**1 Executive Summary 1**

1.1 Build-Up of the Revenue Requirement 1

1.2 Increase in Tariffs Required for Full Cost Recovery 2

1.3 Proposed Tariff Structure and Other Charges 4

1.4 Summary of Impact on Bills 7

1.5 Reducing Costs 10

**2 Introduction 12**

**3 Legal and Regulatory Framework 14**

**4 Regulatory Determination Requested 16**

4.1 Opening Tariffs 16

4.2 Price Adjustment Mechanism (PAM) 17

4.3 Purchased Water Services Pass-Through 18

4.4 K-Factor and X-Factor 18

4.5 Z-Factor 19

4.6 Standby Charge 19

4.7 Charge for Reduced Sewage Volume 19

4.8 Charges for Inactive and Delinquent Accounts 19

4.9 Proposed Standards and Targets 20

4.9.1 Guaranteed Standards 20

4.9.2 Financial performance targets 22

4.9.3 Operational performance targets 23

**5 Revenue Requirement 25**

5.1 Methodology 25

5.1.1 Definition of test year 25

5.1.2 Adjustments to test year 25

5.1.3 Building blocks approach 25

5.2 Operating Expenses 26

5.2.1 Salaries, wages, and related costs 26

5.2.2 Repairs and maintenance 26

5.2.3 Administration 27

5.2.4 Electricity 28
5.2.5 Other operating expenses 28
5.2.6 Summary of operating expenses 28
5.3 Depreciation and Amortization 29
5.4 Loan Interest 30
5.4.1 Loan interest from long-term loans 31
5.4.2 Loan interest from loans used to finance K-Factor projects 32
5.4.3 Foreign exchange losses 33
5.4.4 Summary of loan interest 33
5.5 Return on Equity and Tax Gross-Up 34
5.5.1 Equity base 34
5.5.2 Cost of equity 35
5.5.3 Return on equity 38
5.6 NWC's Revenue Requirement 39
**6 Tariffs Required for Full Cost Recovery 41**
6.1 Adjusting Revenue Requirement for Non-Tariff Revenue 41
6.2 Comparison of Revenue Requirement to Test Year Revenue 42
6.3 Effect of Price Elasticity of Demand 43
6.4 Average Tariff Increases Required to Meet Revenue Requirement 43
6.5 Tariff Schedule that is Needed to Meet the Full Cost Recovery Revenue Requirement 45
6.6 Impact on Customers of Applying the Required Tariff Increase to the Current Tariff Structure 46
6.6.1 Poor households 46
6.6.2 Average households 47
**7 Reasons for Large Gap Between Revenue Requirement and Historic Test Year Revenue 49**
7.1 Increase in the Cost of Service 49
7.1.1 Breakdown of increase in operating expenses 51
7.2 Low Starting Tariffs in October 2013 56
**8 Proposed Tariff Structure and Other Charges 57**
8.1 Criteria for Setting Proposed Tariff Structure and Other Charges 57

8.2 Revenue Requirement Excluding the Return on Equity 57
8.3 Comparison of Revenue Requirement Excluding the Cost of Equity to Test Year Revenue 58
8.4 Residential Tariffs 58
8.4.1 Residential tariffs for water services 59
8.4.2 Residential tariffs for sewerage services 63
8.5 Commercial Tariffs and Standby Charge 66
8.5.1 Commercial tariffs for water services 66
8.5.2 Standby charge 68
8.5.3 Commercial tariffs for sewerage services 70
8.6 Condominium Tariffs 71
8.7 School Tariffs 72
8.8 Service Charges 72
8.9 Price Adjustment Mechanism 73
8.10 Purchased Water Services Charge 75
8.11 K-Factor and X-Factor 75
8.12 Charge for Reduced Sewage Volume 76
8.13 Charges for Inactive and Delinquent Accounts 77

**9 How the Proposed Tariffs Meet NWC's Revenue Requirement 78**

9.1 Water Services 78
9.2 Sewerage Services 80
9.3 Summary 82

**10 Proposed Guaranteed Standards and Performance Targets 83**

10.1 Guaranteed Standards 83
10.2 Financial Performance Targets 85
10.3 Operational Performance Targets 87
10.4 Quality of Service Targets 89
10.5 Glossary 90

**11 Marginal Cost Analysis 92**

11.1 Methodology 92
11.2 Marginal Cost of Providing an Additional Unit of Water 93
11.3 Marginal Cost of Treating an Additional Unit of Wastewater 96
11.4 Comparison of Proposed Tariffs to Marginal Costs 97

# Appendices

**Appendix A : Assessment of the National Water Commission's Performance Against Standards and Targets Set by the Office of Utilities Regulation** 99

**Appendix B : Project Profiles** 112

# Tables

**Table 1.1: NWC's Revenue Requirement** 1

**Table 1.2: Adjusted Revenue Requirement** 2

**Table 1.3: Required Increase in Revenue from Water and Sewerage Services** 2

**Table 1.4: Comparison of Test Year and Required Revenue, Average Tariff, and Consumption** 3

**Table 1.5: Comparison of Requested Rates and Structure to Current Rates and Structure** 5

**Table 1.6: Comparison of Water Service Charges** 5

**Table 1.7: Comparison of Current and Proposed PAM Weights** 6

**Table 1.8: Proposed K-Factor and X-Factor** 6

**Table 1.9: Affordability of Water Bills for Basic Needs Consumption for Poor Customers** 8

**Table 1.10: Affordability of Bills for Basic Needs Consumption for Poor Customers** 8

**Table 1.11: Affordability of Water Bills for Middle Class Customers** 8

**Table 1.12: Affordability of Average Consumption for Middle Class Households** 9

**Table 1.13: Comparison of Water Bill under Current and Proposed Tariffs for Various Commercial Customer Consumption Profiles** 9

**Table 1.14: Comparison of Combined Water and Sewerage Bill under Current and Proposed Tariffs for Various Commercial Customer Consumption Profiles** 10

**Table 4.1: Opening Tariff Schedule** 16

**Table 4.2: Opening Water Service Charges** 16

**Table 4.3: Opening Sewerage Service Charges** 16

**Table 4.3: PAM Indices and Weights** 17

**Table 4.4: Proposed K-Factor and X-Factor** 18
**Table 4.5: Proposed Guaranteed Standards** 20
**Table 4.6: Proposed Financial Performance Targets** 22
**Table 4.7: Proposed Operational Performance Targets** 23
**Table 5.1: Breakdown of Repairs and Maintenance Costs** 27
**Table 5.2: Administration Costs Separated Adjusted by Known and Measurable Adjustments** 28
**Table 5.3: Operating Expenses in Revenue Requirement** 28
**Table 5.4: Allocation of NWC Assets** 30
**Table 5.5: Depreciation and Amortization in Revenue Requirement** 30
**Table 5.6: NWC's Outstanding Loans and Interest Rates** 31
**Table 5.7: NWC's Loan Interest Payment** 32
**Table 5.8: Loan Interest in Revenue Requirement** 33
**Table 5.9: NWC's Equity Base in Historic Test Year** 34
**Table 5.10: NWC's Working Capital in Historic Test Year** 34
**Table 5.11: NWC's Long-term Loans in Historic Test Year** 35
**Table 5.12: Return on Equity in Revenue Requirement** 38
**Table 5.13: Return on Equity and Taxes in Revenue Requirement** 39
**Table 5.14: NWC's Revenue Requirement** 39
**Table 6.1: Breakdown of Other Revenue** 41
**Table 6.2: Adjusted Revenue Requirement** 41
**Table 6.3: NWC's Historic Test Year Revenue from Water and Sewerage Services** 42
**Table 6.4: Required Increase in Revenue from Water and Sewerage Services** 42
**Table 6.5: Comparison of Current and Required Revenue, Average Tariff, and Consumption** 43
**Table 6.6: Adjustment of Test Year Water Revenue** 44
**Table 6.7: Average Increase in Water Tariffs Required** 44
**Table 6.8: Average Increase in Sewerage Tariffs Required** 45
**Table 6.9: Comparison of Current Rates to Rates Required for Full Cost Recovery** 45
**Table 6.10: Comparison of Current Service Charges to Service Charges Required for Full Cost Recovery** 46

**Table 6.11: Full Cost Recovery Tariffs Are Not Affordable for Poor Households** 46

**Table 6.12: Full Cost Recovery Tariffs Are Not Affordable for Average Households** 47

**Table 7.1: Projected Revenue Requirement Based on PAM-Compensated Increase** 49

**Table 7.2: Actual Increase in NWC's Revenue Requirement from 2013 to 2018** 50

**Table 7.3: PAM-Compensated and Actual Change in Cost of Service Building Blocks Over Tariff Period** 50

**Table 7.4: PAM-Adjusted and Actual Change in Operating Expense Components Over Tariff Period** 52

**Table 7.5: Comparison of PAM-Compensated Increase and Actual Increase in Salaries, Wages, and Related Costs** 52

**Table 7.6: Comparison of PAM-Compensated Increase and Actual Increase in Repairs and Maintenance Costs** 54

**Table 7.7: Comparison of PAM-Compensated Increase and Actual Increase in Administration Expenses** 55

**Table 7.8: Comparison of OUR's and NWC's Calculations of Revenue in Historical Test Year for 2013 Tariff Determination** 56

**Table 8.1: NWC's Revenue Requirement Excluding Return on Equity (JMD '000s)** 58

**Table 8.2: Required Increase in Revenue from Water and Sewerage Services** 58

**Table 8.3: Affordability of Water Bills for Basic Needs Consumption for Poor Households** 60

**Table 8.4: Breakdown of Change in Water Bill for Poor Households of 5 People** 61

**Table 8.5: Range of Per Capita Consumption for Various Household Sizes Captured by Average Consumption Block** 62

**Table 8.6: Affordability of Consumption for Average Households** 62

**Table 8.7: Affordability of Bills for Basic Needs Consumption for Poor Households** 65

**Table 8.8: Breakdown of Change in Bill for Poor Households of 5 People** 65

**Table 8.9: Affordability of Consumption for Average Households** 66

**Table 8.10: Comparison of Current and Proposed Commercial Water Tariffs** 67

**Table 8.11: Comparison of Water Bill under Current and Proposed Tariffs for Various Commercial Customer Consumption Profiles** 68

**Table 8.12: Incremental Capacity Cost of Rio Cobre and Rio Bueno** 68

**Table 8.13: Sensitivity Analysis of the Incremental Capacity Cost of Rio Cobre and Rio Bueno** 69

**Table 8.10: Comparison of Current and Proposed Commercial Sewerage Tariffs** 70

**Table 8.14: Comparison of Combined Water and Sewerage Bill under Current and Proposed Tariffs for Various Commercial Customer Consumption Profiles** 71

**Table 8.15: Comparison of Current to Proposed Condominium Tariffs** 71

**Table 8.16: Comparison of Current to Proposed School Tariffs** 72

**Table 8.17: Comparison of Percentage of Customers' Connection Sizes by Customer Category** 72

**Table 8.18: Comparison of Current Water Service Charges to Proposed Water Service Charges** 73

**Table 8.19: PAM Index Weights Based on Test Year Costs** 74

**Table 8.20: Comparison of Current and Proposed PAM Weights** 74

**Table 8.21: Proposed K-Factor and X-Factor** 76

**Table 9.1: Change in Water Consumption due to Change in Tariffs** 78

**Table 9.2: Projected Revenue from Volumetric Water Charges by Customer Category and Consumption Block** 79

**Table 9.3: Projected Revenue from Water Service Charges by Connection Sizes** 80

**Table 9.4: Change in Sewage Volume due to Change in Water Tariffs** 80

**Table 9.5: Projected Revenue from Volumetric Sewerage Charges by Customer Category and Volume Block** 81

**Table 9.3: Projected Revenue from Sewerage Service Charges by Customer Category** 81

**Table 9.6: Revenue from Proposed Tariffs Allow NWC to Meet its Revenue Requirement (Excluding Return on Equity)** 82

**Table 10.1: NWC's Guaranteed Standards** 83

**Table 10.2: Financial Performance Targets** 85

**Table 10.3: Operational Performance Targets** 87

**Table 10.4: Glossary for Critical Measures of NWC's Performance Targets** 90

**Table 11.1: Inputs Used to Calculate Long Run Average Incremental Capacity Costs** 93

**Table 11.2: Long Run Average Incremental Capacity Cost for NWC** 94

**Table 11.3: Long Run Average Incremental Cost for NWC** 95

**Table 11.4: Long Run Average Incremental Cost of Sewage Treatment for NWC** 97

**Table 11.5: Comparison of Proposed Tariffs to Average Incremental Costs (JMD/1,000 IG)** 98

**Table A.1: Summary of NWC's Performance against Guaranteed Standards and Performance Targets** 99

**Table A.2: NWC's Performance Against Guaranteed Standards** 102

**Table A.3: NWC's Performance Against Financial Performance Targets** 104

**Table A.4: NWC's Performance Against Operational Performance Targets** 107

**Table A.5: NWC's Performance Against Quality of Service Targets** 110

# Figures

**Figure 8.1: Comparison of Existing and Proposed Residential Tariffs for Water Services** 59

**Figure 8.2: Comparison of Existing and Proposed Residential Tariffs for Sewerage Services** 64

**Figure 8.3: Proposed Commercial Tariffs for Water Services** 67

**Figure 8.4: Water Standby Charge for Commercial Users** 70

**Figure 8.3: Proposed Commercial Tariffs for Sewerage Services** 71

# Acronyms

| | |
|---|---|
| ANPAM | Annual reset for PAM |
| CAPM | Capital Asset Pricing Model |
| CPI | Consumer Price Index |
| CRP | Country risk premium |
| CWTC | Central Wastewater Treatment Company |
| DSCR | Debt service coverage ratio |
| EBITDA | Earnings before interest, tax, depreciation and amortization |
| EDWT | Economic development wastewater tariff |
| ERP | Equity Risk Premium |
| IG | Imperial Gallons |
| IJAM | Interim Jamaica Standards for Drinking Water |
| JMD | Jamaican Dollars |
| JPS | Jamaican Public Service Company Ltd |
| lpcd | Liters per capita per day |
| LRMC | Long Run Marginal Cost |
| MLD | Million liters per day |
| MMRP | Mature market risk premium |
| NEPA Standards | National Environment Policy Act (standards) |
| NRW | Non-revenue Water |
| NWC | National Water Commission |
| OUR | Office of Utilities Regulation |
| PAM | Price Adjustment Mechanism |
| psi | Pressure per square inch |
| US$ | United States Dollars |
| WACC | Weighted average cost of capital |
| WPA | Water purchase agreement |
| WWTP | Wastewater treatment plant |
| YTM | Yield-to-maturity |

# 1 Executive Summary

This document presents the submission for a reset of the National Water Commission's tariffs and service standards, from January 2019 to December 2021. This executive summary first reports the tariff increase that would be needed for full cost recovery. NWC then argues that tariff increases at this level would not be affordable to poor or middle-class customers. To ensure affordability, NWC requests a tariff structure that covers its operating expenses, depreciation, and loan interest, but does not provide a return on equity. Changes in the tariff structure to ensure that water for basic needs is affordable even to the poorest households, and that large users are kept on the system, are also proposed.

## 1.1 Build-Up of the Revenue Requirement

NWC's revenue requirement is equal to NWC's cost of service. The cost of service was estimated using the building blocks approach, based on test year audited financials. This approach is modelled off the approach set out in the JPS license and the approach used by the OUR for NWC in 2013.

Table 1.1 shows NWC's revenue requirement is the sum of operating expenses, depreciation and amortization, loan interest, return on equity, and taxes. The total revenue requirement is JMD37,916,611,419, of which JMD29,116,751,698 is the revenue requirement for water services and JMD8,799,859,721 is the revenue requirement for sewerage services.

**Table 1.1: NWC's Revenue Requirement**

| Building Block | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Operating Expenses | 21,102,438 | 5,781,848 | 26,884,286 |
| Depreciation and Amortization | 3,798,586 | 1,430,463 | 5,229,049 |
| Loan Interest | 1,711,627 | 644,561 | 2,356,187 |
| Return on Equity | 1,669,400 | 628,659 | 2,298,059 |
| Taxes | 834,700 | 314,329 | 1,149,030 |
| **Total Revenue Requirement** | **29,116,752** | **8,799,860** | **37,916,611** |

Source: Table 5.14

In setting tariffs, adjustments should be made to the revenue requirement to account for revenue from 'other' sources (bulk water, new installations, reconnections, and cesspool). The adjusted revenue requirement will be the revenue required from water and sewerage services, including service charges.

In the historical test year, other revenue was JMD0.5 billion,[1] as shown in the Supplementary Information of NWC's Financial Statements.[2] As Table 1.2 shows, the adjusted revenue requirement is JMD37.4 billion, which is calculated by deducting the JMD0.5 billion of expected other revenue from the total revenue requirement of JMD37.9 billion.

[1] NWC. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I (page 69).

[2] Summarized in Table 6.1.

**Table 1.2: Adjusted Revenue Requirement**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Revenue requirement for full cost recovery | 29,116,752 | 8,799,860 | 37,916,611 |
| Adjustments to account for expected revenue from bulk water, new installations, reconnections, and cesspool | (509,789) | (39,739) | (549,528) |
| **Adjusted revenue requirement from water and sewerage services, including water service charges** | **28,606,963** | **8,760,121** | **37,367,083** |

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69).

## 1.2 Increase in Tariffs Required for Full Cost Recovery

NWC's revenue requirement for full cost recovery is JMD37.4 billion, which is 39 percent higher than NWC's revenue in the historic test year (JMD26.9 billion).[3] As shown in Table 1.3, the revenue requirement for water services (JMD28.6 billion) is 35 percent higher than historic test year revenue from water services (JMD21.2 billion). The revenue requirement for sewerage services (JMD8.8 billion) is 55 percent higher than historic test year revenue from sewerage services (JMD5.7 billion).

**Table 1.3: Required Increase in Revenue from Water and Sewerage Services**

| | Water | Sewerage | Total |
|---|---|---|---|
| Revenue requirement from water and sewerage services (JMD '000s) | 28,606,963 | 8,760,121 | 37,367,083 |
| Historic test year revenue from water and sewerage services (JMD '000s) | 21,210,222 | 5,661,627 | 26,871,849 |
| Shortfall (JMD '000s) | 7,396,741 | 3,098,494 | 10,495,234 |
| **Required increase in revenue from water and sewerage services (%)** | **35%** | **55%** | **39%** |

Source: Table 6.2; Table 6.3.

Given price elasticity of demand—meaning, given that consumers are likely to reduce their consumption when the price rises—tariffs would need to rise by more than 35 percent (water) and 55 percent (sewerage) to meet the revenue requirement. This submission assumes a price

[3] See Section 6

elasticity of demand for water supply services of -0.2, which indicates that for every 1 percent increase in tariffs, consumption is expected to fall by 0.2 percent.[4]

The required increase in tariffs to achieve full cost recovery is 50 percent for water services and 72 percent for sewerage services. As shown in Table 1.4, a 50 percent increase in volumetric water tariffs (from JMD909/1,000IG to JMD1,362/1,000IG) is expected lead to a 10 percent decrease in water consumption due to price elasticity. Together, the increase in volumetric water tariffs and decrease in consumption result in the 35 percent required increase in water revenue.[5]

Sewage volume is expected to decrease by the same percentage (10 percent) as water consumption. Sewerage tariffs would need to rise by 72 percent (from JMD972/1,000IG to JMD1,671/1,000IG) to generate the 55 percent increase in revenue needed to cover the revenue requirement.[6]

**Table 1.4: Comparison of Test Year and Required Revenue, Average Tariff, and Consumption**

| | Test Year | | Required | |
|---|---|---|---|---|
| | Water | Sewerage | Water | Sewerage |
| Revenue (JMD '000s) | 21,210,222 | 5,661,627 | 28,606,963 | 8,760,121 |
| Less Revenue from Fixed Charges (JMD '000s) | (3,785,362) | - | (5,105,449) | - |
| Revenue from Volumetric Charges (JMD '000s) | 17,424,860 | 5,661,627 | 23,501,514 | 8,760,121 |
| % Change in Revenue from Volumetric Charges | N/A | N/A | 35% | 55% |
| Average Volumetric Tariff (JMD/ 1,000 IG) | 909 | 972 | 1,362 | 1,671 |
| % Change in Average Volumetric Tariff | N/A | N/A | 50% | 72% |
| Consumption (1,000 IG) | 19,160,703 | 5,822,343 | 17,252,708 | 5,242,563 |
| % Change in Consumption | N/A | N/A | -10% | -10% |

Source: Table 1.3, Section 6.4, Table 6.5, Table 6.6.

NWC does not recommend that tariffs are increased to the level that would be required for full cost recovery, as this could be unaffordable for its customers. For households of five people in the bottom income quintile, the water bill for basic needs consumption (50lpcd or 1,650IG/month) would be 6.3 percent of total household expenditure, materially exceeding the affordability benchmark of 5 percent.[7] Further, this would be a 47 percent increase compared to an equivalent bill based on current tariffs.

[4] See Section 6.3

[5] JMD1,362/1,000IG x 17,252,708,000 IG = JMD23,501,514,000. This is 35 percent higher than JMD17,424,860,000

[6] JMD1,671/1,000IG x 5,242,563,000 IG = JMD8,760,121,000. This is 55 percent higher than JMD5,661,627,000

[7] See Section 6.6.1

Similarly, households of five people in the medium income quintile would see water bills for an average volume of consumption (125lpcd or 4,124IG/month) rise by 51 percent. These households would be spending 5.3 percent of total household expenditure on water.

NWC accepts that it should not earn a return on equity through a tariff increase, but rather should earn that return through efficiency improvements.

## 1.3 Proposed Tariff Structure and Other Charges

NWC's proposed tariff structure would allow NWC to cover operating expenses, loan interest, and depreciation, but not a return on equity. Excluding the return on equity and taxes (JMD3.4 billion), NWC's revenue requirement is JMD33.9 billion. Reaching this revenue requirement entails an average increase of 23 percent for revenue from water charges (compared to 50 percent under full cost recovery), and an average increase of 38 percent for revenue from sewerage charges (compared to 72 percent under full cost recovery).

To meet this revenue requirement, while also fulfilling objectives of affordability and efficiency, NWC proposes the following changes to its tariff structure:

- Consolidation of residential blocks from six blocks to three blocks, where:
  - The first block would apply up to the 'basic needs' volume for an above average-sized household, with a rate set below average cost to ensure affordability for the poor
  - The second block would apply to average volumes, with a rate set near average cost
  - The third block would apply to excess volumes, with a rate set above average cost to promote efficiency and deter waste.
- Holding the increase for the water rate for the first residential block and the service charge for the smallest connection size to just 5 percent, to ensure affordability of a basic needs consumption of water for poor customers
- Introduction of a decreasing block tariff for commercial consumption above 2 million IG/month, to encourage large users to stay on NWC's system
- Introduction of a standby charge for major commercial users who only retain their NWC connections to use the NWC network as a backup water supply
- Introduction of a sewerage service charge to reflect NWC's fixed costs of providing customers with sewerage services
- Increasing water tariffs for commercial (first block), condominiums, and schools by 36 percent (water) and 46 percent (sewerage). Given the required increase in revenue of 23 percent (water) and 38 percent (sewerage)—and the desire to keep the increase in the lifeline water residential block low at 5 percent—it is necessary for commercial customers to bear a greater proportion of the burden of the tariff increase.

Table 1.5 summarizes the requested rates and structure and compares them to the current rates and structure. The full regulatory determination requested is set out in Section 4 of the body of the submission.

**Table 1.5: Comparison of Requested Rates and Structure to Current Rates and Structure**

| Customer Category and Block | Current | | | Proposed | | |
|---|---|---|---|---|---|---|
| | Consumption / Volume | Water Rate | Sewerage Rate | Consumption / Volume | Water Rate | Sewerage Rate |
| | 1,000 IG/month | JMD/1,000 IG | | 1,000 IG/month | JMD/1,000 IG | |
| **Residential** | | | | | | |
| Block 1 | 0 to 3 | 471 | 428 | 0 to 2 | 495 | 483 |
| Block 2 | 3 to 6 | 831 | 754 | 2 to 7 | 1,032 | 1,007 |
| Block 3 | 6 to 9 | 897 | 815 | Over 7 | 1,720 | 1,678 |
| Block 4 | 9 to 12 | 1,146 | 1,040 | N/A | N/A | N/A |
| Block 5 | 12 to 20 | 1,427 | 1,295 | N/A | N/A | N/A |
| Block 6 | Over 20 | 1,836 | 1,667 | N/A | N/A | N/A |
| **Commercial** | | | | | | |
| Block 1 | All | 1,768 | 1,605 | 0 to 2,000 | 2,396 | 2,337 |
| Block 2 | All | 1,768 | 1,605 | Over 2,000 | 1,147 | 1,119 |
| **Condominium** | All | 877 | 796 | All | 1,188 | 1,159 |
| **School** | All | 707 | 642 | All | 958 | 935 |

Table 1.6 summarizes the requested water service charges and compares them to the current water service charges.

**Table 1.6: Comparison of Water Service Charges**

| Meter Size | Percentage of Residential Customers (%) | Percentage of All Customers (%) | Current Service Charge (JMD) | Proposed Service Charge (JMD) | Percentage Increase in Service Charge (%) |
|---|---|---|---|---|---|
| 5/8 inch/15mm | 99.6% | 98.8% | 830 | 870 | 5% |
| 3/4 inch/20mm | 0.1% | 0.1% | 1,700 | 2,140 | 26% |
| 1 inch/25mm | 0.3% | 0.7% | 2,220 | 2,800 | 26% |
| 1 1/4 inch/30mm | 0.0% | 0.0% | 4,180 | 5,270 | 26% |
| 1 1/2 inch/40mm | 0.0% | 0.1% | 4,180 | 5,270 | 26% |
| 2 inch/50mm | 0.0% | 0.2% | 5,920 | 7,460 | 26% |
| 3 inch/75mm | 0.0% | 0.0% | 10,750 | 13,550 | 26% |
| 4 inch/100mm | 0.0% | 0.1% | 17,370 | 21,890 | 26% |
| 6 inch/150mm | 0.0% | 0.0% | 26,460 | 33,340 | 26% |

NWC also proposes to introduce sewerage service charges of JMD400/month for non-commercial customers and JMD5,000/month for commercial customers.

### Price Adjustment Mechanism (PAM)

Currently, the PAM tracks for movements in three indices—the CPI, the Jamaica dollar/US dollar exchange rate, and the electricity price. NWC considers that the three indices generally have worked well to track input cost increases for NWC's inputs and should be maintained. However, weights should be revised to reflect the changes in the proportions of various costs in NWC's cost of service. As shown in Table 1.7, NWC proposes that the PAM be index weights be 58 percent for CPI, 20 percent for electricity prices, and 22 percent for the foreign exchange index.

**Table 1.7: Comparison of Current and Proposed PAM Weights**

| Index | Proposed Weight | Current Weight |
|---|---|---|
| CPI | 58% | 51% |
| Electricity Prices | 20% | 25% |
| Foreign Exchange Index | 22% | 24% |
| **Total** | **100%** | **100%** |

Source: Table 8.20.

OUR. "National Water Commission Review of Rates: Determination Notice", 92. 1 October 2013.

### K-Factor and X-Factor

NWC requests that the K-Factor, which will be used to finance OUR-approved K-Factor projects, be maintained at 16 percent (see Table 1.8).[8] NWC requests that the X-Factor be set at 0 percent, as NWC would not earn a return on equity under the proposed tariff structure. The net impact of the K-Factor and X-Factor on base tariffs would be 16 percent.

**Table 1.8: Proposed K-Factor and X-Factor**

| | FY2019 | FY2020 | FY2021 | FY2022 |
|---|---|---|---|---|
| X-Factor | 0% | 0% | 0% | 0% |
| K-Factor | 16% | 16% | 16% | 16% |

K-Factor funding to date has allowed NWC to make efficiency-enhancing gains. The efficiency gains from these projects are already embodied in NWC's cost of service now. Thus, the X-Factor must be set at a level that matches the efficiency gains NWC is expected to be able to achieve in the tariff period. The projects that can achieve significant efficiency gains are NRW reduction projects. However, further NRW reduction performance-based contracts are not likely to start until 2 years from now. Thus, rather than impose an X-Factor that will starve NWC of the revenue it needs to cover the bare minimum of its cost of service, it is better to reset the tariffs again after 3 years, when the size of the efficiency gains will be known and measurable.

[8] NWC. "Tariff" (https://www.nwcjamaica.com/Rates, accessed 17 September 2018).

### Purchased water services charge

NWC requests that the OUR add a 'purchased water service charge' to be included in customers' bills. NWC needs to be able to pass on charges which result from OUR-approved prices set by entities which provide bulk water, wastewater collection and treatment, or NRW reduction services to NWC. A purchased water service pass-through charge is reasonable because, when approving these costs, the OUR is already checking for the efficiency of the costs.[9]

### Charge for reduced sewage volume

NWC proposes to eliminate the economic development wastewater tariff (EDWT). Currently, EDWT is a reduced rate that applies to commercial users which use water as an input to their operations, and thus do not return all water consumption as wastewater to the NWC sewer network. Instead, NWC proposes to charge applicable customers based on a reduced sewage volume. NWC will allow adjustments to sewage volume for customers that can prove how much wastewater they discharge.[10]

### Charges for Inactive and Delinquent Accounts

NWC proposes the following charges for inactive and delinquent accounts:

- An estimated sewerage service bill for customers who have been disconnected from water supply for non-payment of bills but are still benefiting from sewerage services provided by the NWC
- A late payment interest charge for commercial accounts that remain unpaid 7 days after the due date
- A late payment fee of JMD250 and offer an early payment incentive fee of JMD250 for residential customers.[11]

## 1.4 Summary of Impact on Bills

Under NWC's proposed tariffs, bills will rise, but will remain affordable for residential customers.

### Residential bills

Households that consume a basic needs quantity of water (50lpcd) would face a 9 percent increase in their water bills, as shown in Table 1.9. For households of five people or more in the bottom income quintile, the total water bill under the proposed tariffs would be less than 5 percent of expenditure. However, for poor households of 4 people or less, the total water bill under proposed tariffs would be slightly (three tenths of one percent) more than 5 percent of expenditure. This is primarily due to the high service charge. In NWC's judgment, this bill is still affordable.

[9] See Section 8.10

[10] See Section **Error! Reference source not found.**

[11] See Section 8.13

**Table 1.9: Affordability of Water Bills for Basic Needs Consumption for Poor Customers**

| Household Size | Consumption (IG) | Water Bill under Existing Tariffs (JMD) | Water Bill under Proposed Tariffs (JMD) | % Increase | Water Bill as % of Expenditure under Existing Tariffs | Water Bill as % of Expenditure under Proposed Tariffs |
|---|---|---|---|---|---|---|
| 4 | 1,320 | 1,625 | 1,767 | 9% | 4.9% | 5.3% |
| 5 | 1,650 | 1,799 | 1,957 | 9% | 4.3% | 4.9% |
| 6 | 1,980 | 1,973 | 2,146 | 9% | 3.9% | 4.3% |

Source: Table 8.3 and Table 8.4.

For poor households that are connected to the sewer network, the total bill for basic needs consumption would increase by 27 to 32 percent (see Table 1.10). For a family of five, the total bill under proposed tariffs would increase to 8.0 percent of expenditure, compared to 6.2 percent of expenditure today.

**Table 1.10: Affordability of Bills for Basic Needs Consumption for Poor Customers**

| Household Size | Consumption (IG) | Bill under Existing Tariffs (JMD) | Bill under Proposed Tariffs (JMD) | % Increase | Bill as % of Expenditure under Existing Tariffs | Bill as % of Expenditure under Proposed Tariffs |
|---|---|---|---|---|---|---|
| 4 | 1,320 | 2,256 | 2,971 | 32% | 6.7% | 8.9% |
| 5 | 1,650 | 2,588 | 3,345 | 29% | 6.2% | 8.0% |
| 6 | 1,980 | 2,920 | 3,719 | 27% | 5.8% | 7.4% |

Source: See sources in Table 8.4 and Table 8.7.

Households that consume an average volume of water (125lpcd) would face an increase of 32 percent to 33 percent in their water bills, as shown in Table 1.11. For a household of five in the medium income quintile, this corresponds to 4.6 percent of expenditure, which is considered affordable.

**Table 1.11: Affordability of Water Bills for Middle Class Customers**

| Household Size | Consumption (IG) | Water Bill under Existing Tariffs (JMD) | Water Bill under Proposed Tariffs (JMD) | % Increase | Water Bill as % of Expenditure under Existing Tariffs | Water Bill as % of Expenditure under Proposed Tariffs |
|---|---|---|---|---|---|---|
| 4 | 3,300 | 2,789 | 3,713 | 33% | 3.4% | 4.6% |
| 5 | 4,124 | 3,558 | 4,701 | 32% | 3.5% | 4.6% |
| 6 | 4,950 | 4,324 | 5,689 | 32% | 3.5% | 4.7% |

Source: See sources in Table 8.4 and Table 8.6.

For average households that are connected to the sewer network, the total bill for average consumption would increase by 45 to 52 percent (see Table 1.12). The total bill under proposed tariffs for a household of five people would be 8.6 percent of expenditure, compared to 5.9 percent of expenditure today.

**Table 1.12: Affordability of Average Consumption for Middle Class Households**

| Household Size | Consumption (IG) | Bill under Existing Tariffs (JMD) | Bill under Proposed Tariffs (JMD) | % Increase | Bill as % of Expenditure under Existing Tariffs | Bill as % of Expenditure under Proposed Tariffs |
|---|---|---|---|---|---|---|
| 4 | 3,300 | 4,478 | 6,816 | 52% | 5.5% | 8.4% |
| 5 | 4,124 | 5,942 | 8,767 | 48% | 5.9% | 8.6% |
| 6 | 4,950 | 7,405 | 10,718 | 45% | 6.1% | 8.8% |

Source: See sources in Table 8.4 and Table 8.9.

### Commercial bills

Table 1.13 compares water bills for commercial customers with various consumption levels. In the proposed structure, the water bill increases by 45 percent at lower consumption levels. However, at higher consumption volumes, the bill would decrease, due to the declining block structure.

**Table 1.13: Comparison of Water Bill under Current and Proposed Tariffs for Various Commercial Customer Consumption Profiles**

| Consumption (IG) | Water Bill Under Current Tariffs (JMD) | Water Bill Under Proposed Tariffs (JMD) | Percentage Increase (%) |
|---|---|---|---|
| 1,000,000 | 1,924,130 | 2,780,682 | 45% |
| 2,000,000 | 3,846,830 | 5,559,624 | 45% |
| 3,000,000 | 5,769,530 | 6,889,789 | 19% |
| 4,000,000 | 7,692,230 | 8,219,955 | 7% |
| 5,000,000 | 9,614,930 | 9,550,120 | -1% |
| 6,000,000 | 11,537,630 | 10,880,285 | -6% |

For commercial customers that are connected to the sewer network, the bill in the proposed structure increases by 50 percent at lower consumption levels (see Table 1.14). However, at higher consumption volumes, the bill would decrease, due to the declining block structure.

**Table 1.14: Comparison of Combined Water and Sewerage Bill under Current and Proposed Tariffs for Various Commercial Customer Consumption Profiles**

| Consumption (IG) | Bill Under Current Tariffs (JMD '000s) | Bill Under Proposed Tariffs (JMD '000s) | Percentage Increase (%) |
|---|---|---|---|
| 1,000,000 | 3,669,113 | 5,491,875 | 50% |
| 2,000,000 | 7,336,795 | 10,982,011 | 50% |
| 3,000,000 | 11,004,477 | 13,610,092 | 24% |
| 4,000,000 | 14,672,159 | 16,238,173 | 11% |
| 5,000,000 | 18,339,842 | 18,866,254 | 3% |
| 6,000,000 | 22,007,524 | 21,494,335 | -2% |

## 1.5 Reducing Costs

NWC recognizes that, even without earning a return on equity, the tariffs it requests would result in an increase that will be difficult for some customers. NWC is committed to reducing its cost of service.

The most effective way for NWC to reduce its average cost of service is to implement performance-based contracts (PBCs) for NRW reduction. While some projects are underway, significant reductions in NRW have not occurred to date mainly due to delays in procuring contractors.

Procurement rules mean that is virtually impossible to procure an NRW-PBC in less than 2 years. In practice, the NRW reduction contract for Kingston took 3 years from decision to implementation.[12] In the Northern Parishes, a pre-feasibility study confirming the desirability of an NRW-PBC was completed in April 2017.[13] The request for proposal to hire a consultant to prepare the feasibility study and provide transaction advisory services for the project has been issued over a year later in September 2018, with services expected to begin in April 2019. Considering the remaining steps to be completed, it is unlikely that a contractor could start work before March 2020—3 years after the urgent need for the project was identified.

While significant gains from NRW reduction projects are unlikely to materialize during the 2018 to 2021 tariff period, this does not mean that NWC's tariffs should be set below the rates proposed in this submission. Rather, it is essential that tariffs are set at the levels proposed, for NWC to be able to cover its operating costs, loan interest, and depreciation; and to implement efficiency enhancing projects through the K-Factor program.

Further, NWC is exploring new governance, business model, and PPP options that will enable it to be more efficient. These initiatives will also take about 3 years to roll out. In the meantime, NWC aims to reduce its cost of service in real terms, and suggests that the proposed tariff

[12] Inter-American Development Bank. "Kingston Metropolitan Area (KMA) Water Supply Improvement Program (2633/OC-JA) Procurement Plan". 19 January 2012.

[13] Castalia. "Northern Parishes Water Supply Project: Pre-Feasibility Study to Assess Viability of PPP Transaction" April 2017.

structure apply for three years, allowing reduced costs of service to be reflected in tariffs at that point.

# 2 Introduction

Through this submission, the National Water Commission (NWC) requests revisions to its tariffs, other charges, and performance targets, for the period January 2019 to December 2021. The submission is in accordance with the Water Sector Policy of Jamaica, the Office of Utilities Regulation Act (OUR Act), the National Water Commission Act (NWC Act) and the Regulatory Framework established by the Office of Utilities Regulation (OUR).

**Objectives of the submission**

NWC needs to be supported by a tariff regime that allows it to meet its cost of service. In this application, NWC is proposing a revised tariff regime which will:

1. Support the objectives of improving and expanding potable water and sewerage services to address the needs of the people of Jamaica
2. Encourage the utility to improve operating efficiencies by providing appropriate incentives
3. Allow NWC to achieve financial viability to autonomously sustain its operations and finance system developments.

**Challenges of decaying infrastructure and service expansion needs**

NWC is grappling with the challenges of decaying infrastructure which need major rehabilitation or replacement. The utility is challenged to expand its services to facilitate developments and curtail environmental degradation due to untreated wastewater.

To fulfill these objectives, major investments will be required over the next decade. Given Jamaica's fiscal constraints, these investments will have to be financed by NWC. The utility therefore needs to not only recover its operating and maintenance costs, but also to be sufficiently viable to attract the necessary financing. It must also earn enough revenue to be able to maintain those assets properly.

**Form of regulatory regime proposed**

The tariff control mechanism proposed is a price cap regime which fixes rates for a set period such that adjustments are only made for price escalations, plus an allowance for funds to be used in specific capital expenditure programs. It is proposed that this regime continue. The price cap regime encourages the utility to improve its operating efficiency and the benefits of these improvements are passed on to consumers.

The NWC also proposes to continue with the set of Guaranteed Standards and performance targets similar to those that now apply. Some modifications are proposed.

**Structure of the submission**

This submission starts with an overview of NWC's legal and regulatory framework (Section 3). Then, the regulatory determination requested is presented in Section 4. This summarizes all the decisions that the NWC requests of the OUR.

Section 5 presents NWC's calculation of its revenue requirement, which is equal to the cost of service. After describing the methodology used, the calculations are presented, separately for water and sewerage services, as well as for NWC as a whole.

Based on the revenue requirement, the tariffs required for full cost recovery are discussed in Section 6. This is followed by an explanation of why such large increase tariffs are required for NWC to fully meet its revenue requirement (Section 7).

As the increase in tariffs required for full cost recovery is too large, NWC proposes a different tariff regime for the next regulatory period (Section 8). Proposed other charges are also presented here. Section 9 then explains how the proposed tariffs allows NWC to meet an adjusted revenue requirement.

In Section 10, NWC proposes the Guaranteed Standards and performance targets for this regulatory period. NWC's performance against the standards and targets in the current tariff period are appended in Appendix A. Finally, marginal costs of service for water and wastewater are presented in Section 11. In Appendix B, project profiles for planned capital projects are included.

# 3 Legal and Regulatory Framework

NWC is a body corporate established under Section 3 of the NWC Act. The functions of NWC include to "provide and improve water supply services throughout the Island" and "maintain and operate water supply services provided by the Commission".[14]

The Office of Utilities Regulation (OUR) is responsible for regulating the supply and distribution of water and the provision of sewerage services.[15] The OUR has specific authority to approve the rates charged for the provision of these services.[16]

Sections 11 and 12 of the OUR Act provide as follows:

4. *(1) Subject to subsection (3), the Office may, either of its own motion or upon application made by a licensee or specified organization (whether pursuant to subsection (1) of section 12 or not) or by any person, by order published in the Gazette prescribe the rates or fares to be charged by a licensee or specified organization in respect of its prescribed utility services.*

   *(2) For the purposes of this section, the Office may conduct such negotiations as it considers desirable with a licensee or specified organization, industrial, commercial or consumer interest, representatives of the Government and such other persons or organizations as the Office thinks fit.*

   *(3) The provisions of subsections (1) and (2) shall not apply in any case where an enabling instrument specifies the manner in which rates may be fixed by a licensee or specified organization.*

5. *(1) Subject to subsection (2), an application may be made to the Office by a licensee or specified organization by way of a proposed tariff specifying the rates or fares which the licensee or specified organization proposes should be charged in respect of its prescribed utility services and the date (not being earlier than the expiration of thirty days after the making of the application) on which it is proposed that such rates should come into force (hereinafter referred to as the specified date).*

   *(2) As respects a specified organization referred to in section 13 an application made under subsection (1) of this section shall take into account the provisions of section 13.*

   *(3) Where an application by way of a proposed tariff is made under subsection (1) notice of such application and, if so required by the Office, a copy of such tariff shall be published in the Gazette and in such other manner as the Office may require.*

   *(4) A notice under subsection (3) shall specify the time (not being less than fourteen days after the publication of the notice in the Gazette) within which objections may be made to the Office in respect of the proposed tariff to which the notice relates.*

   *(5) Subject to the provisions of this Act, the Office may, after the expiration of the time specified in the notice under subsection (3), make an order either –*

      *(a) confirming the proposed tariff without modifications or with such modifications as may be specified in the order; or*

      *(b) rejecting the proposed tariff.*

[14] NWC Act, s.4(1)(d-e).

[15] The OUR Act, s.4.

[16] The OUR Act, s.4(4), 11, 12, 13.

*(6) If, after publication of the notice of an application in accordance with subsection (3), no order under subsection (5) has been made prior to the specified date, the proposed tariff shall come into force on the specified date.*

*(7) An order confirming a proposed tariff shall not bring into operation any rates or fares on a date prior to the date of such order."*

# 4 Regulatory Determination Requested

This section summarizes the regulatory determination NWC is requesting of the OUR. NWC requests that this tariff regime be in place for 3 years (from January 2019 to December 2021). All rates shown in this section are set at April 2018 price levels and should be adjusted for PAM variable from April 2018 up to the effectiveness date.

## 4.1 Opening Tariffs

NWC requests that, effective as of 1 January 2019, the rates for water and sewerage services be as shown in Table 4.1.

**Table 4.1: Opening Tariff Schedule**

| Customer Category and Block | Opening Water Tariff (JMD / 1,000 IG) | Opening Sewerage Tariff (JMD / 1,000 IG) |
|---|---|---|
| **Residential Tariffs** | | |
| Block 1: 0IG – 2,000IG | 495 | 483 |
| Block 2: 2,000IG – 7,000IG | 1,032 | 1,007 |
| Block 3: Over 7,000IG | 1,720 | 1,678 |
| **Commercial Tariffs** | | |
| Block 1: 0IG – 2,000,000IG | 2,396 | 2,337 |
| Block 2: Over 2,000,000IG | 1,147 | 1,119 |
| **Condominium Tariffs** | 1,188 | 1,159 |
| **Schools Tariffs** | 958 | 935 |

NWC requests that, effective as of 1 January 2019, water service charges be as shown in Table 4.2.

**Table 4.2: Opening Water Service Charges**

| Meter Size | Service Charge (JMD / Month) |
|---|---|
| 5/8 inch/15mm | 870 |
| 3/4 inch/20mm | 2,140 |
| 1 inch/25mm | 2,800 |
| 1 1/4 inch/30mm | 5,270 |
| 1 1/2 inch/40mm | 5,270 |
| 2 inch/50mm | 7,460 |
| 3 inch/75mm | 13,550 |
| 4 inch/100mm | 21,890 |
| 6 inch/150mm | 33,340 |

NWC requests that, effective as of 1 January 2019, sewerage service charges by as shown in Table 4.3

**Table 4.3: Opening Sewerage Service Charges**

| Customer Category | Service Charge (JMD / Month) |
|---|---|
| Residential | 400 |
| Commercial | 5,000 |
| Condominium | 400 |
| Schools | 400 |

## 4.2 Price Adjustment Mechanism (PAM)

NWC requests that the tariff continues to be indexed to input price increases through the Price Adjustment Mechanism (PAM). The purpose of the PAM is to adjust the tariff for changes in input costs which are beyond NWC's control. The formula is described below:

$$PAM = [w_{fe} * \Delta FE + w_{CPI} * \Delta CPI + w_{ec} * \Delta kwh]$$

Where,

- $w_{fe}$ is the weight for foreign exchange
- $w_{CPI}$ is the weight for CPI
- $w_{ec}$ is the weight for electricity costs
- $\Delta$ is the percentage change in the respective variables, that is, current value of each variable less the base value. The variables are:
  - CPI: Inflation, as measured by the Jamaican consumer price index
  - FE: Rate of exchange between the JMD and the US$
  - kWh: Average price per kWh paid for electricity.

The weights are derived from the portion of NWC's total cost of service that is affected by the five variables. The weights for the PAM are shown in Table 4.4.

**Table 4.4: PAM Indices and Weights**

| Index | Proposed Weight |
|---|---|
| CPI | 58% |
| Electricity Prices | 20% |
| Foreign Exchange Index | 22% |

The indices will be applied monthly. The PAM will be reset on 1 April of each year. At this time, new base values for the three components will be set. The annual reset for PAM (ANPAM) will be based on the following formula:

$$ANPAM = [w_{fe} * \Delta FE + w_{CPI} * \Delta CPI + w_{ec} * \Delta kwh]$$

Where,

- $w_{fe}$ is the weight for foreign exchange
- $w_{CPI}$ is the weight for CPI

- $w_{ec}$ is the weight for electricity costs
- $\Delta$ is the percentage change in the respective variables, that is, current value of each variable less the base value.

## 4.3 Purchased Water Services Pass-Through

NWC proposes adding a 'purchased water service charge' to be included in customers' bills. Eligible purchased water service charges will be those charges, whether variable or fixed, that meet the following criteria:

- The charge is for a supply of a water or wastewater service, where:
  - Water services include the supply of bulk water; distribution of water; and reduction in water losses
  - Wastewater services include collection of waste-water, treatment of waste-water, disposal of effluent, and treatment and disposal of sludge.
- The charge is incurred pursuant to a contract with a third-party provider, where:
  - The use of such a third-party provider was included in an improvement plan proposed by NWC and approved by the OUR
  - The third-party provider was procured in accordance with a process approved by the OUR.

All eligible purchased water services charges incurred each month will be added and recovered through billings in the following month. All charges related to water services will be added, divided by the volume of water sold, and the resulting figure in JMD/1,000IG will be multiplied by each customer's billed water consumption and added to the customer's bill. Charges related to wastewater services will be divided by the total volume of wastewater billed, and the resulting unit charge multiplied by the wastewater billed to each customer and added to the customer's bill.

## 4.4 K-Factor and X-Factor

NWC requests that the K-Factor be maintained at 16 percent as set out in Table 4.5. NWC requests that the X-Factor be set at 0 percent, as NWC would not earn a return on equity under the proposed tariff structure.

**Table 4.5: Proposed K-Factor and X-Factor**

| | FY2019 | FY2020 | FY2021 | FY2022 |
|---|---|---|---|---|
| X-factor | 0% | 0% | 0% | 0% |
| K-factor | 16% | 16% | 16% | 16% |

The K-Factor will be used to finance K-Factor projects, as approved by the OUR. NWC will account for the deemed K-factor cash inflow calculated on the basis of 90 percent of the K-factor billing. This means that NWC would be required to deposit into the K-Factor bank account 90 percent of billed K-Factor revenue. The separate bank account shall accommodate the cash flows from the K-Factor. The NWC will report monthly to the OUR on balances and changes on the account, within 45 days of each reporting period. K-Factor billed shall be deemed collected within 45 days after billing.

## 4.5 Z-Factor

NWC should be allowed to charge a Z-Factor, as a special adjustment to the PAM, to account for exogenous events that satisfy all of the following criteria:

- Affect NWC's costs
- Are not due to NWC's managerial decisions
- Are not captured by the other elements of the price regime.

## 4.6 Standby Charge

NWC proposes a water standby charge of JMD781/1,000IG. This charge will be applied to major commercial users who retain their NWC connections to use the NWC network as a backup water supply. The standby charge will require such customers to pay for the availability of NWC's capacity even when they do not use the capacity.

If a standby water user consumes all or part of its standby volume, NWC proposes charging the user at a volumetric water rate of JMD1,375/1,000IG (up to 2,000,000IG/month) and JMD366/1,000IG (above 2,000,000 IG/month).

To ensure proper functioning of the regime, NWC will implement the following rules:

- Each commercial user will be identified as a 'standby user' or a 'non-standby user'. This will be done through self-identification, and through identification by NWC
- Usage of non-standby users (meaning those that are not identified as standby users, and do not pre-agree a standby volume) will be monitored. Suspicious consumption patterns—such as alternating between zero or very low consumption some months, and very high consumption in others—will be analyzed to check if the user should transition to a standby rate
- Standby users will be required to set their desired standby volume on a forward-looking basis for the next 12 months. Standby volumes must be agreed in advance to oblige the standby user to pay for the standby service
- A penalty of two times the normal volumetric rate will apply if standby users exceed the pre-agreed standby volume.

## 4.7 Charge for Reduced Sewage Volume

NWC proposes a new regime to charge commercial users which use water as an input to their operations. These customers do not return all water consumption as wastewater to the NWC sewer network. Instead of charging a reduced *rate* for wastewater services, NWC will instead charge the usual rate for a reduced *volume* of wastewater.

NWC will allow adjustments to wastewater consumption for customers that can prove how much wastewater they discharge, for example through: measurements from a sewerage discharge meter (permanent installation), a sewerage flow monitoring device (temporary installation), or an internal process meter (measures the volume of water that does not return to the sewerage system).

## 4.8 Charges for Inactive and Delinquent Accounts

NWC has determined that there are customers who have been disconnected from water supply for non-payment of bills but are still benefiting from sewerage services provided by NWC. In

many cases, these customers remain "inactive" for prolonged periods and receive no further penalties for their actions to the extent that the usage of water resumes without the detection of the company. NWC suggests charging these customers an estimated sewerage service bill.

In addition, NWC proposes to charge a late payment interest charge for commercial accounts that remain unpaid 7 days after the due date. The planned interest charge is similar to that recently applied by JPS.

Last, NWC plans to continue to charge residential customers a late payment fee of JMD250 and offer an early payment incentive fee of JMD250.

NWC requests that, in its determination, the OUR confirm that it has no objections to the assessment of charges to delinquent and inactive customers.

## 4.9 Proposed Standards and Targets

NWC proposes to keep the existing Guaranteed Standards and streamline the performance targets. NWC also proposes to adjust some performance targets to reflect expectations of gradual improvement in performance.

### 4.9.1 Guaranteed Standards

NWC's proposed Guaranteed Standards are shown in Table 4.6.

**Table 4.6: Proposed Guaranteed Standards**

| Code | Category | Standard | Description | Compensation Type |
|---|---|---|---|---|
| WGS1 | Access | Connection to Supply | Maximum of ten (10) working days to connect supply and install meter after establishment of contract | Claim |
| WGS2 | Delivery of Bills | Issue of First Bill | Maximum of forty (40) working days after connection of supply | Claim |
| WGS3 | Appointments | Issue of First Bill | Must make and keep an appointment at customer's request and must notify customer at least twenty-four (24) hours prior to the appointed time, if the appointment will not be kept | Claim |
| WGS4(a) | Complaints | Acknowledgement | Maximum of five (5) working days to acknowledge customer written complaints after receipt | Claim |
| WGS4(b) | Complaints | Investigations | Maximum of thirty (30) working days from the date of receipt of the complaint to complete investigation and respond or provide an update | Claim |
| WGS5 | Disconnection | Wrongful Disconnection | Where the NWC disconnects a supply that has no overdue amount or is currently under investigation by the OUR or the NWC and only the disputed amount is in arrears | Automatic |

| Code | Category | Standard | Description | Compensation Type |
|---|---|---|---|---|
| WGS6 | Account Status | Issue of Account Status | Meter to be read on same day customer is moving if on a weekday or within two (2) working days of move if on a weekend, provided five (5) working days' notice of move is given. Maximum time of fifteen (15) working days to provide final bill after move and forty-five (45) days to refund the credit balances | Claim |
| WGS7 | Water Meters | Meter Installation | Maximum of thirty (30) working days to install meter on customer's written request | Claim |
| WGS8 | Water Meters | Repair of Replacement of Faulty Meters | Maximum of twenty (20) working days to verify, repair or replace meter after defect is identified or reported | Automatic |
| WGS9 | Water Meters | Changing Meters | NWC must provide customer with details of the date of the change, the reading on the old meter on the day and serial number of the new meter | Claim |
| WGS10(a) | Water Meters | Meter Reading | There should NOT be more than two (2) consecutive estimated bills (where NWC has access to meter) | Automatic |
| WGS10(b) | Water Meters | Exceptional Meter Reading | Where the NWC obtains a reading that falls within its exceptions criteria (60% high and 40% low), same is to be verified, the customer alerted upon verification and the reading applied to the customer's account within one (1) billing period | Claim |
| WGS11 | Reconnection | Reconnection after Payment of Overdue Amount | Maximum of twenty-four (24) hours to restore supply | Automatic |
| WGS12 | Reconnection | Reconnection after Wrongful Disconnection | NWC must reconnect a supply that was inadvertently disconnected within eight (8) hours of being notified of the error | Automatic |
| WGS13 | Compensation | Payment of Compensation | Maximum of thirty (30) working days to process and apply credit to customer's account | Automatic |
| WGS14 | Estimation of Consumption | Method of Estimation | An estimated bill should be based on the average of the last three (3) readings | Automatic |
| WGS15 | Billing Adjustment | Timeliness of Adjustment to Customer's Account | Where necessary, customer's account must be billed for an adjustment within three (3) months of (i) identification of error; or (ii) subsequent to replacement of faulty meter | Claim |

Source: See Table 10.1.

### 4.9.2 Financial performance targets

NWC's proposed Financial Performance Targets are shown in Table 4.7.

**Table 4.7: Proposed Financial Performance Targets**

| Objective | Critical Measures | Type | Targets | | | |
|---|---|---|---|---|---|---|
| | | | FY2019 | FY2020 | FY2021 | FY2022 |
| Receivables | Days of Sales Outstanding for non-Government customers | Target (Max) | 60 | 55 | 50 | 45 |
| | Days of Sales Outstanding for Government customers | Target (Max) | 215 | 200 | 180 | 160 |
| Billing and Collection | Collection Rate | Target (Min) | 90% | 90% | 91% | 92% |
| Asset Valuation | Assets should reflect fair market valuation. | Target | 100% | | | |
| X-factor | The X-factor is to be calculated as a deduction from the bill after the normal rates and PAM. | Target | Keep | | | |
| K-factor | The K-factor should be calculated on the bill balance after the X-Factor. The NWC shall account for the deemed K-factor cash inflows on the basis of [X]% of the K-factor billing | Target | 90% | 90% | 91% | 92% |
| K-factor Monitoring | NRW Reporting† | Target | Yes | Yes | Yes | Yes |
| Profitability | Profit Margin | Target (Min) | 6% | 8% | 8% | 8% |
| Efficiency | EBITDA Margin | Target (Min) | 10% | 30% | 30% | 30% |
| Liquidity | Quick Ratio | Target (Min) | 0.6 | 0.75 | 0.9 | 1.1 |
| | Quick Ratio* | Target (Min) | 0.9 | 1.0 | 1.1 | 1.2 |
| Bankability | Debt Service Coverage Ratio | Target (Min) | 1.2 | 2.0 | 2.0 | 2.0 |
| Gearing | Debt Ratio | Target (Max) | 80% | 75% | 70% | 65% |

Source: See Table 10.2.

### 4.9.3 Operational performance targets

NWC's proposed operational performance targets are shown in Table 4.8.

**Table 4.8: Proposed Operational Performance Targets**

| Objectives | Critical Measures | Definition | FY 2019 | FY 2020 | FY 2021 | FY 2022 |
|---|---|---|---|---|---|---|
| **Non-Revenue Water (NRW)** | NRW as % of Production (Max.) | 1 - (Billed Authorized Consumption/Total Water Production) | **73%** | **72%** | **71%** | **70%** |
| | NRW in liters per connection per day | Liters of NRW per active water connection per day | **1,736** | **1,648** | **1,566** | **1,489** |
| **Coverage** | Water and Sewer Coverage | Population with access to the service as a percentage of the total population (water) | **51%** | **53%** | **55%** | **57%** |
| | | Population with access to the service as a percentage of the total population (sewage) | **11%** | **12%** | **13%** | **14%** |
| **Water Quality** | Percentage of Compliance with IJAM Standards (Min.) | Percentage of Compliance with IJAM Standards | **99%** | **99%** | **99%** | **99%** |
| **Wastewater Quality** | Percentage of Compliance with NEPA Standards (Min.) | Percentage of Compliance with NEPA Standards | **100%** | **100%** | **100%** | **100%** |
| **Improving Billing** | Metering Level | Number of Water Connections with Functioning Meters EoY / Total Number of Active Water Connections EoY | **87%** | **87%** | **87%** | **87%** |
| **Improve Billing** | Percentage of Meters Read | Number of Meters Read / Total Meters | **97%** | **97%** | **97%** | **97%** |
| **Increase Staff Efficiency** | Staff Efficiency | Number of Water and Sewage Employees / Number of Water Connections (in 1000) | **4.9** | **4.8** | **4.7** | **4.6** |
| **Increase Staff Efficiency** | Staff Efficiency Sewage | Number of Sewage Employees / Number of Sewage Connections EoY (in '000) | **1.4** | **1.4** | **1.4** | **1.4** |
| **Increase Energy Efficiency** | Energy Efficiency | Total MWh Consumption / System Input Volume (IG Millions) | **2.1** | **2.1** | **2.1** | **2.1** |

Source: See Table 10.3.

# 5 Revenue Requirement

This section presents NWC's revenue requirement, which is equal to NWC's cost of service. After describing the methodology used, the calculations are presented, separately for water and sewerage services, as well as for NWC as a whole.

## 5.1 Methodology

NWC does not have specific tariff setting rules. As such, the tariff setting approach used by JPS was applied for NWC where applicable. The approach used by JPS is an established methodology in Jamaica, well-known by the OUR, with written rules in the JPS licence.

The approach applied for NWC calculates the cost of service (equal to the revenue requirement) based on a test year, using the building blocks approach.

### 5.1.1 Definition of test year

The JPS licence defines "test year" as "the latest 12 months of operations for which there are audited accounts".[17] The OUR applied the same definition of "test year" in its 2013 Determination Notice for NWC. As such, NWC has applied this definition in the current tariff submission.

NWC's most recent audited accounts are for the financial year from 1 April 2017 to 31 March 2018. NWC's external auditor, KPMG, issued the opinion that NWC's financial statements "give a true and fair view of the financial position of [NWC] as at March 31, 2018".[18]

### 5.1.2 Adjustments to test year

The JPS licence allows adjustments to values from the test year to reflect "normal operational conditions, if necessary; and such changes in revenues and costs as are known and measurable with reasonable accuracy at the time of filing and which will become effective within 12 months of the time of filing".[19] In its 2013 Determination Notice for NWC, the OUR allowed the same adjustments to values from the test year.[20]

As such, NWC has adjusted the test year values from its financial statements for known and measurable changes that will become effective by September 2019, 12 months after the filing date of September 2018.

### 5.1.3 Building blocks approach

The building blocks approach is a methodology for calculating the cost of service (equal to the revenue requirement), where operating expenses, depreciation and amortization, return on debt (loan interest), return on equity, and taxes are summed.

Test year values for operating expenses and depreciation and amortization come directly from the audited accounts. Return on debt is estimated by multiplying the weighted average interest rate of all long-term loans by the average principal outstanding in the period, and adding foreign exchange losses (an implicit cost of debt). The return on equity is estimated using the

[17] Jamaica Public Service Company Limited. "Electricity Licence", 23. Schedule 3,1.

[18] National Water Commission. "Financial Statements March 31, 2018", 1.

[19] Jamaica Public Service Company Limited. "Electricity Licence", 23. Schedule 3,1.

[20] OUR. "National Water Commission Review of Rates Determination Notice", 45. 1 October 2013.

Capital Asset Pricing Model (CAPM), the same methodology applied by the OUR for NWC in 2013. Taxes are calculated based on the post-tax return on equity.

Each of the building blocks are discussed in the sections below. In the discussion of each building block we define the building block; provide the test year values from the audited financial statements for water, sewerage, and the total; state any adjustments; and, if relevant, provide the adjusted value.

## 5.2 Operating Expenses

Operating expenses in the test year were JMD26,863,981,000, of which JMD21,090,778,000 was attributed to providing water services and JMD5,773,230,000 was attributed to providing sewerage services. These values can be found in the Supplementary Information to the Financial Statements.[21]

Operating expenses for NWC include staff costs, repairs and maintenance costs, administration costs, electricity costs, telephone costs, fuel and lubricants costs, regulatory fees, water purchases, and Soapberry costs.

Each of these items are discussed below.

### 5.2.1 Salaries, wages, and related costs

In addition to salaries and wages, this operating expense item includes allowances, pensions, gratuity, group insurance, travelling and transportation, and statutory contributions. Salaries, wages, and related costs in the test year were JMD9,033,027,000, of which JMD7,278,547,000 was attributed to providing water services and JMD1,754,480,000 was attributed to providing sewerage services.[22]

### 5.2.2 Repairs and maintenance

The repairs and maintenance operating expense item include general repairs (pipes), materials and supplies, motor vehicles, plant and equipment, building, chemicals, equipment rental, reinstatement of roads, office furniture and equipment, and claims and contingencies. Repairs and maintenance costs in the test year were JMD4,960,560,000, of which JMD2,543,889,000 was attributed to providing water services and JMD2,416,671,000 was attributed to providing sewerage services.[23]

The cost of materials and supplies for providing sewerage services, listed as JMD2,186,495,000 in the financial statements,[24] includes fees paid to the Central Wastewater Treatment Company (CWTC) for sewerage treatment costs at the Soapberry Wastewater Treatment Plant (Soapberry). Soapberry costs total JMD1,452,437,000 in the test year.[25] We separate Soapberry

[21] National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69).

[22] National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69).

[23] National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", II. (page 70).

[24] National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", II. (page 70).

[25] National Water Commission. "Finance Report March 2018", 7.

costs in the itemized cost of service calculation because it is not an internal repairs and maintenance expense for NWC, but rather an external fee.

After subtracting Soapberry costs, NWC's other repairs and maintenance costs for sewerage services are JMD964,234,000 (see Table 5.1). The total for other repairs and maintenance costs would be JMD3,508,123,000.

**Table 5.1: Breakdown of Repairs and Maintenance Costs**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Repairs and Maintenance Costs on Financial Statements | 2,543,889 | 2,416,671 | 4,960,560 |
| Soapberry Costs | - | 1,452,437 | 1,452,437 |
| Other Repairs and Maintenance Costs | 2,543,889 | 964,234 | 3,508,123 |

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69). National Water Commission. "Finance Report March 2018", 7.

### 5.2.3 Administration

The administration operating expense item includes bad debts, rent, rates and taxes, security services, insurance charges, computer services, printing and stationery, consultancy fees, postage and cables, overseas travel, audit and accounting fees, staff welfare, legal expenses, advertising, and miscellaneous expenses. Administration costs in the test year were JMD5,119,662,000, of which JMD4,070,688,000 was attributed to providing water services and JMD1,048,974,000 was attributed to providing sewerage services.[26]

Administration costs have been adjusted by JMD11,660,477 to account for known and measurable future expenses on water abstraction fees. During the 2017/2018 financial year, NWC was not required to pay water abstraction fees. In the 2018/2019 financial year, water abstraction fees will be JMD11,660,477, as evidenced by an invoice from the Water Resources Authority to NWC.[27] The fees are expected to be a recurring annual cost.

Administration costs have been adjusted by JMD8,645,000 to account for known and measurable future expenses on wastewater discharge fees. While these fees have been mandated since 2013,[28] NWC has not paid these fees to date. Starting from the 2018/2019 financial year, costs due to wastewater discharge fees will be JMD8,645,000, based on NWC's calculations of wastewater discharge fees to be paid for 14 existing wastewater treatment plants.[29] The fees are expected to be a recurring annual cost.

Table 5.2 shows that after adding known and measurable adjustments, NWC's adjusted administration costs is JMD5,139,967,477.

[26] NWC. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", II. (page 70).

[27] Water Resources Authority. "Invoice IN000000737".

[28] "The Natural Resources Conservation Authority Act.", Schedule 3. 24 April 2013.

[29] "Proposed Discharge Fee Payments to NEPA for CReW Plants."

**Table 5.2: Administration Costs Separated Adjusted by Known and Measurable Adjustments**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Administration Costs on Financial Statements | 4,070,688 | 1,048,974 | 5,119,662 |
| Water Abstraction Fees | 11,660 | - | 11,660 |
| Wastewater Discharge Fees | - | 8,645 | 8,645 |
| **Adjusted Administration Costs** | **4,082,348** | **1,057,619** | **5,139,967** |

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69).

Water Resources Authority. "Invoice IN000000737".

"The Natural Resources Conservation Authority Act.", Schedule 3. 24 April 2013.

### 5.2.4 Electricity

The electricity operating expense item in the test year were JMD6,924,413,000, of which JMD6,426,264,000 was attributed to providing water services and JMD498,149,000 was attributed to providing sewerage services.[30]

### 5.2.5 Other operating expenses

Other operating expense items includes telephone costs, fuel and lubrications, and water purchases. Other operating expenses in the test year were JMD826,319,000, of which JMD771,390,000 was attributed to providing water services and JMD54,929,000 was attributed to providing sewerage services.[31]

### 5.2.6 Summary of operating expenses

Table 5.3 summarizes NWC's total operating expenses of JMD26,884,286,477, of which JMD21,102,438,477 was attributed to providing water services and JMD5,781,848,000 was attributed to providing sewerage services.

**Table 5.3: Operating Expenses in Revenue Requirement**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Salaries, Wages, and Related Cost | 7,278,547 | 1,754,480 | 9,033,027 |
| Repairs and Maintenance | 2,543,889 | 964,234 | 3,508,123 |
| *Administration (in financial statements)* | *4,070,688* | *1,048,974* | *5,119,662* |

[30] NWC. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", II (page 70).

[31] NWC. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", II. (page 70).

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| *Administration (known and measurable adjustments)* | *11,660* | *8,645* | *20,305* |
| Administration (in revenue requirement) | 4,082,348 | 1,057,619 | 5,139,967 |
| Electricity | 6,426,264 | 498,149 | 6,924,413 |
| Telephone | 110,925 | 29,229 | 140,154 |
| Fuel and Lubrication | 246,046 | 25,700 | 271,746 |
| Water Purchase | 414,419 | - | 414,419 |
| Soapberry Cost | - | 1,452,437 | 1,452,437 |
| **Total Operating Expenses** | **21,102,438** | **5,781,848** | **26,884,286** |

Source: NWC. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", 69-70.

Water Resources Authority. "Invoice IN000000737".

"The Natural Resources Conservation Authority Act.", Schedule 3. 24 April 2013.

National Water Commission. "Finance Report March 2018", 7.

## 5.3 Depreciation and Amortization

Depreciation and amortization charges for the test year come from NWC's Statement of Profit or Loss and Other Comprehensive Income for the financial year 2017/2018. The reported total is JMD5,229,049,000.[32] Note 12 and Note 13 of the financial statements show that JMD57,402,000 was attributed to amortization charges and JMD5,171,647,000 was attributed to depreciation charges.[33]

In its 2013 Determination Notice, the OUR included only depreciation, not amortization, in NWC's cost of service. NWC believes that amortization should also be included as it applies to intangible assets as depreciation applies to tangible assets. NWC's reported amortization applies to computer software,[34] which has a definite asset life and needs to be replaced periodically.

**Breakdown of depreciation and amortization between water and sewerage services**

The breakdown of depreciation and amortization charges between water and sewerage services is based on the proportion of NWC's water and sewerage assets in NWC's fixed asset register. Administration assets (computers and electronics, motor vehicles, furniture and equipment, and land for administration properties) are allocated to water or sewerage based on the proportion of active water connections to active sewerage connections.

Table 5.4 shows how NWC's assets are allocated to water and sewerage services. The first three columns of Table 5.4 show the net book value of NWC's assets as of 31 March 2018,

[32] National Water Commission. "Financial Statements, March 31, 2018", 12.

[33] National Water Commission. "Financial Statements, March 31, 2018", 39, 41.

[34] National Water Commission. "Financial Statements, March 31, 2018", 39.

categorized into water (68 percent of all assets), sewerage (26 percent of all assets), and administration (6 percent of all assets).[35]

NWC has 375,493 active water connections and 111,726 active sewerage connections, meaning 77 percent of connections are water connections and 23 percent of connections are sewerage connections. As shown in the fourth column in Table 5.4, 77 percent of NWC's administration assets (JMD1,638,555,000) are allocated to water and 23 percent (JMD487,544,000) are allocated to sewerage. This results in 73 percent of all NWC assets allocated to water services (JMD24,586,302,000), and 27 percent of all NWC assets allocated to sewerage services (JMD9,258,653,000).

**Table 5.4: Allocation of NWC Assets**

| Asset Category | Net Book Value as at 31 March 2018 (JMD '000s) | As % of Net Book Value of all Assets | Net book value of re-allocated admin* assets (JMD '000s) | Total net book value after allocation of admin assets (JMD '000s) | As % of Net Book Value after allocation of admin assets to water and sewerage |
|---|---|---|---|---|---|
| Water | 22,947,747 | 68% | 1,638,555 | 24,586,302 | **73%** |
| Sewerage | 8,771,110 | 26% | 487,544 | 9,258,653 | **27%** |
| Admin | 2,126,099 | 6% | - | - | **0%** |
| Total | 33,844,955 | 100% | 2,126,099 | 33,844,955 | **100%** |

*'Admin' refers to administration.

Source: NWC. "Schedule of Property, Plant, and Equipment."

To summarize, Table 5.5 shows the breakdown of the depreciation and amortization component of the revenue requirement, disaggregated by water and sewerage services. JMD3,798,586,000 is attributed to providing water services and JMD1,430,463,000 is attributed to providing sewerage services, for a total of JMD5,229,049,000.

**Table 5.5: Depreciation and Amortization in Revenue Requirement**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Depreciation | 3,757,438 | 1,414,967 | 5,171,647 |
| Amortization | 41,148 | 15,496 | 57,402 |
| **Total Depreciation and Amortization** | **3,798,586** | **1,430,463** | **5,229,049** |

Source: NWC. "Financial Statements". 31 March 2018. Notes 12 and 13, pages 39-41.

## 5.4 Loan Interest

Loan interest consists of total loan interest from NWC's long-term loans, less loan interest from loans used to finance K-Factor projects, plus foreign exchange losses.

[35] NWC. "Schedule of property, plant, and equipment."

### 5.4.1 Loan interest from long-term loans

Total loan interest from long-term loans is calculated as (JMD1,933,073,799). This figure was derived by multiplying the weighted average interest rate of all long-term loans by the average principal outstanding in the period (see Table 5.6 and Table 5.7). The weighted average interest rate of NWC's long term loans is 5.0 percent.[36] The average principal outstanding in the period is JMD38,462,024,022, calculated by averaging the beginning of period principal outstanding (JMD39,903,688,043) and end of period principal outstanding (JMD37,020,359,000).[37]

**Table 5.6: NWC's Outstanding Loans and Interest Rates**

| Loan | Beginning of Period Principal Outstanding (JMD '000s) | End of Period Principal Outstanding (JMD '000s) | Average Principal Outstanding (JMD '000s) | Interest Rate (%) |
|---|---|---|---|---|
| Government of Jamaica – Jamaican Dollar | 789,645 | 789,645 | 789,645 | 2.00% |
| Government of Jamaica – US$7,499,999 | 965,004 | 944,887 | 954,946 | 3.38% |
| Government of Jamaica – €212,155 | 28,100 | 28,100 | 28,100 | 5.77% |
| Inter-American Development Bank | 2,330,224 | 2,112,637 | 2,221,431 | 2.65% |
| Inter-American Development Bank | 12,414,857 | 12,107,581 | 12,261,219 | 2.65% |
| The Bank of Nova Scotia Jamaica Limited | 36,811 | - | 18,406 | 6.25% |
| The Bank of Nova Scotia Jamaica Limited | 9,924 | - | 4,962 | 6.75% |
| JCSD Trustee Services Limited | 1,889,979 | 1,889,979 | 1,889,979 | 8.95% |
| BNP – Paribas | 6,503,799 | 5,697,882 | 6,100,841 | 7.02% |
| Vinci Construction Grand Projects | 879,894 | 765,823 | 822,859 | 9.77% |
| Vinci Construction Grand Projects | 329,987 | 287,207 | 308,597 | 9.77% |

[36] Calculated from information in Note 17 of the National Water Commission's "Financial Statements March 31, 2018".

[37] Calculated from information in Note 17 of the National Water Commission's "Financial Statements March 31, 2018".

| Loan | Beginning of Period Principal Outstanding (JMD '000s) | End of Period Principal Outstanding (JMD '000s) | Average Principal Outstanding (JMD '000s) | Interest Rate (%) |
|---|---|---|---|---|
| National Housing Trust | 82,351 | 74,383 | 78,367 | 5.00% |
| Syndicated Loan | 12,083,994 | 10,866,206 | 11,475,100 | 7.55% |
| National Commercial Bank Jamaica Limited | 78,750 | 61,875 | 70,188 | 10.85% |
| National Commercial Bank Jamaica Limited | 826,500 | 652,086 | 739,293 | 10.38% |
| National Commercial Bank Jamaica Limited | 386,002 | 377,955 | 381,979 | 3.25% |
| Sagicor Bank | - | 213,778 | 106,889 | 9.50% |
| **Total** | **39,903,688** | **37,020,359** | **38,462,024** | **5.03%** |

Source: NWC. "Financial Statements" 31 March 2018, Note 17, page 45-47.

Loan interest was allocated to water and sewerage services based on the proportion of NWC's water and sewerage assets (as shown in Table 5.4).

**Table 5.7: NWC's Loan Interest Payment**

| | Water | Sewerage | Total |
|---|---|---|---|
| Percentage of Total Assets (%) | 73% | 27% | 100% |
| Loan Interest (JMD '000s) | 1,404,261 | 528,813 | 1,933,074 |

Source: NWC. "Financial Statements" 31 March 2018, Note 17, page 45. Table 5.4.

### 5.4.2 Loan interest from loans used to finance K-Factor projects

Revenue to cover loan interest for loans used to finance K-Factor projects will be separately obtained through K-Factor proceeds, so it is not included in the revenue requirement. Loan interest on loans used to fund K-Factor projects is JMD650,772,956,[38] using the same methodology for calculating total loan interest (see Table 5.6). The weighted average interest rate of NWC's loans used to fund K-Factor projects is 4.5 percent. The average principal outstanding in the period for loans used to fund K-Factor projects is JMD14,825,547,292.[39]

Loans used to fund K-Factor projects (as of 31 March 2018) include:

[38] Calculated from information in Note 17 of the National Water Commission's "Financial Statements March 31, 2018".

[39] Calculated from information in Note 17 of the National Water Commission's "Financial Statements March 31, 2018".

- Inter-American Development Bank Loan with loan balance of JMD12,107,581,000 as of 31 March 2018 (of which 73 percent is for K-Factor)
- National Housing Trust Loan with loan balance of JMD74,383,000 as of 31 March 2018
- BNP-Paribas Loan with loan balance of JMD5,697,882,000 as of 31 March 2018 (of which 65 percent is for K-Factor)
- Vinci Construction Grand Projects Loans with loan balance of JMD1,053,030,000 as of 31 March 2018 (of which 65 percent is for K-Factor)
- National Commercial Bank Loan with loan balance of JMD377,955,000 as of 31 March 2018
- CReW Loan (from National Commercial Bank) with loan balance of JMD652,086,000 as of 31 March 2018.

### 5.4.3 Foreign exchange losses

Foreign exchange losses are an implicit cost of debt, and as such should be included in NWC's revenue requirement. NWC's foreign exchange losses result from its large US dollar- and Euro-denominated debt positions. NWC incurs foreign exchange losses when the Jamaican dollar depreciates against the US dollar or Euro because all loans received in such currencies are revalued in Jamaican dollars at the current exchange rate for accounting purposes.

Foreign exchange losses are an implicit cost of debt because Jamaican dollar-denominated loans have higher interest rates compared to US dollar or Euro-denominated loans. This is due to higher expected inflation in Jamaica compared to the United States and Europe. While NWC can borrow in US dollars or Euros at lower interest rates, it must incur foreign exchange losses. This means that foreign exchange losses incurred on foreign-denominated debt should be treated as part of the cost of debt, and therefore as part of the cost of service.

NWC's average foreign exchange losses in the past 5 years is JMD1,073,886,500.[40] There are no known and measurable reasons to adjust this figure for this tariff period. The Jamaican dollar has consistently depreciated against the US dollar for decades, and by 3.5 percent in from April 2018 to July 2018 alone,[41] so it is reasonable to assume that foreign exchange losses will continue.

### 5.4.4 Summary of loan interest

The loan interest component of the revenue requirement is estimated at JMD2,356,187,343 billion, of which JMD1,711,626,831 is attributed to providing water services, and JMD644,560,513 is attributed to providing sewerage services (see Table 5.8).

**Table 5.8: Loan Interest in Revenue Requirement**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Total loan interest from long-term loans | 1,404,261 | 528,813 | 1,933,074 |

[40] NWC. Statement of Profit or Loss and Other Comprehensive Income from financial year 2014 to 2018.

[41] Bank of Jamaica. "Historical Exchange Rates." (http://www.boj.org.jm/foreign_exchange/fx_historical_rates.php, accessed 13 September 2018).

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Loan interest from loans used to finance K-Factor projects | (472,747) | (178,026) | (650,773) |
| Foreign exchange losses | 780,113 | 293,773 | 1,073,887 |
| **Total loan interest component of the revenue requirement** | **1,711,627** | **644,561** | **2,356,187** |

Source: NWC calculations based on NWC "Financial Statements". 31 March 2018

## 5.5 Return on Equity and Tax Gross-Up

NWC's return on equity is calculated by multiplying its equity base by its cost of equity.

### 5.5.1 Equity base

NWC's equity base of JMD9.6 billion can be calculated by deducting long-term loans (JMD42.8 billion) from its rate base (JMD52.4 billion). The rate base is calculated as the sum of non-current assets and working capital. This is the same definition used by the OUR for calculating JPS's equity base.[42] The breakdown of the equity base shown in Table 5.9 comes from NWC's 2018 audited financial statements.

**Table 5.9: NWC's Equity Base in Historic Test Year**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Non-current assets[43] | 41,145,086 | 15,494,322 | 56,639,408 |
| Working capital | (3,102,528) | (1,168,343) | (4,270,871) |
| Rate Base | 38,042,558 | 14,325,979 | 52,368,537 |
| Long-term loans | (31,058,556) | (11,695,960) | (42,754,516) |
| **Equity Base** | **6,984,002** | **2,630,019** | **9,614,021** |

Source: The National Water Commission. "Financial Statements: Commission Statement of Financial Position", 11. 31 March 2018

Table 5.10 shows a breakdown of NWC's working capital in the historic test year. Working capital was allocated to water and sewerage services based on the proportion of NWC's water and sewerage assets (as shown in Table 5.4).

**Table 5.10: NWC's Working Capital in Historic Test Year**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| + Consumers' accounts receivable | 4,782,127 | 1,800,843 | 6,582,970 |

[42] OUR. "Jamaica Public Service Company Limited Tariff Review for Period 2014-2019: OUR Determination Notice", 121

[43] Non-current assets of JMD56,639,408,000 is equal to total non-current assets (JMD56,715,492) in Statement of Financial Position less investments (JMD76,084,000).

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| + Other accounts receivable and prepaid expenses | 595,149 | 224,120 | 819,269 |
| + Inventories | 1,106,381 | 416,638 | 1,523,019 |
| - Deposits and retentions | (157,506) | (59,313) | (216,819) |
| - Trade accounts payable | (5,405,979) | (2,035,771) | (7,441,750) |
| - Other accounts payable | (2,785,195) | (1,048,843) | (3,834,038) |
| - Taxation payable | (1,237,505) | (466,017) | (1,703,522) |
| **Working Capital** | **(3,102,528)** | **(1,168,343)** | **(4,270,871)** |

Source: The National Water Commission. "Financial Statements: Commission Statement of Financial Position", 11. 31 March 2018. Table 5.4.

Table 5.11 shows a breakdown of NWC's long-term loans in the historic test year. Long-term loans were allocated to water and sewerage services based on the proportion of NWC's water and sewerage assets (as shown in Table 5.4).

**Table 5.11: NWC's Long-term Loans in Historic Test Year**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| + Total non-current liabilities | 39,546,968 | 14,892,506 | 54,439,474 |
| + Current maturities of long-term loans | 10,052,158 | 3,785,418 | 13,837,576 |
| - Employee benefit obligations | (18,540,569) | (6,981,965) | (25,522,534) |
| **Long-term loans** | **31,058,556** | **11,695,960** | **42,754,516** |

Source: The National Water Commission. "Financial Statements: Commission Statement of Financial Position", 11. 31 March 2018. Table 5.4.

### 5.5.2 Cost of equity

According to the CAPM, the cost of equity (also called rate of return) on any asset (or asset base) equals the risk-free rate plus the risk premium. One standard approach for calculating the risk premium is to multiply the company's beta by the Equity Risk Premium (ERP). According to Dr. Aswath Damodaran, a Professor of Finance at the Stern School of Business of New York University, and supported by many other practitioners of corporate finance, there is more risk in investing in an emerging market country than in a country with a mature market. The ERP for an investment in an emerging market country is therefore equal to the base premium for a mature market risk premium (MMRP) plus a country risk premium (CRP).

Using this approach, the nominal cost of equity for an investment in a country that cannot be considered to have a mature market (such as Jamaica) can be estimated using the following formula:

$$\text{cost of equity (nominal)} = \text{risk free rate} + \beta_E(\text{MMRP} + \text{CRP})$$

Because the purpose of calculating the cost of equity for the NWC is to estimate the return on equity that the company should recover through the tariff, and because NWC's assets will be revalued each year in a way that takes account of inflation, we use the cost of equity in real terms. To estimate the real cost of equity, the nominal US dollar cost of equity can be converted into real terms using the following formula:

$$\text{cost of equity (real)} = \frac{\text{cost of equity (nominal)} - \textit{expected inflation}}{1 + \textit{expected inflation}}$$

These formulas were applied by the OUR for NWC in its 2013 Determination Notice. The inputs to the formula have been calculated using the same methodology as applied by the OUR for NWC in its 2013 Determination Notice.

**Risk-free rate**

The risk-free rate is the nominal interest rate that can be obtained by investing in financial instruments with no default risks. We use **2.84 percent** as the risk-free rate, which is equal to the current yield-to-maturity (YTM) on non-inflation-indexed 10-year US Treasury bonds, as of 19 July 2018.[44]

**Equity beta ($\beta_E$)**

Beta is a measure of the correlation between the company's risk and general market risk. Beta indicates whether a company's risk level is lower or higher than the risk level of an average company. Investing in a company that is riskier than the market average requires returns higher than the market average; conversely, investing in a company that is less risky than the market average requires returns less than the market average.

Changes in the capital structure of a firm (for example, an increase in the amount of capital that is funded with debt), will increase a firm's beta. For this reason, it is important to differentiate between the levered beta of a firm (the "equity beta") and the unlevered beta of a firm (the "asset beta" since its value is determined by the assets owned by the firm). Deriving an estimate of an equity beta for an investment in a country (or set of countries) whose stock market is small, non-existent, or has a short history is imprecise. Since this is the case for Jamaica, we use an average asset beta of water utilities in the world.

$\beta_E$ denotes NWC's equity beta. The equity beta is calculated by the formula:

$$\beta_E = \beta_A + (\beta_A) \times (\frac{D}{E}) \times (1 - t)$$

Where:

- $\beta_E$ is the equity beta
- $\beta_A$ is the asset beta. We take this from a data set of 109 water utilities in the world (dated January 2018) from Damodaran.[45] This is 0.76.

[44] U.S. Department of the Treasury. "Daily Treasury Yield Curve Rates." (https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2018)

[45] Aswath Damodaran. "Total Beta By Industry Sector: Global" (http://www.stern.nyu.edu/~adamodar/pc/datasets/totalbetaGlobal.xls, accessed 14 September 2018).

- $D$ is the percent of company financing from debt (81.6 percent)[46]
  - This is calculated as the debt base divided by the rate base (see Table 5.9 for sources)

$$D = \frac{\text{JMD52,368,537}}{\text{JMD56,639,408}} = 0.816$$

- $E$ is the percent of company financing from equity (18.4 percent)[47]
  - This is calculated as the equity base divided by the rate base (see Table 5.9 for sources)

$$E = \frac{\text{JMD9,614,021}}{\text{JMD56,639,408}} = 0.184$$

- $t$ is NWC's corporate tax rate, at 33.3 percent.[48]

Inputting the values into the equation results in an equity beta of **3.02**:

$$\beta_E = 0.76 + (0.76) \times \frac{0.816}{0.184} \times (1 - 33.3\%) = 3.02$$

**Mature market risk premium**

The MMRP is the expected return over the risk-free rate that investors require to invest in a well-diversified portfolio of risky assets in a mature market. The MMRP is calculated as the expected return on the market minus the risk-free rate.

We use a MMRP of 5.08 percent, based on data published by Damodaran using an implied equity premium. This is calculated by computing the implied equity risk premium for the S&P 500.[49] The implied equity risk premium is calculated by subtracting the risk-free rate from free cash flow from equity (FCFE) for firms in the S&P 500.

**Country risk premium**

The CRP is the expected return above the MMRP that investors require for investing in a country whose market is not mature (for example, Jamaica). To derive the CRP for NWC, we use the difference in YTM between Jamaican 10-year US$-denominated government bonds and 10-year US Treasury bonds traded in the United States.

Bloomberg reports the YTM on non-inflation indexed 10-year GOJ US$-denominated government bonds as 5.59 percent as of 20 June 2018.

United States Federal Reserve data shows that the YTM on non-inflation indexed 10-year US Treasury bonds is 2.84 percent as of 19 June 2018.[50]

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[46] The National Water Commission. "Financial Statements: Commission Statement of Financial Position", 11. 31 March 2018

[47] The National Water Commission. "Financial Statements: Commission Statement of Financial Position", 11. 31 March 2018

[48] The National Water Commission. "Financial Statements: Commission Statement of Financial Position", 55. 31 March 2018

[49] Aswath Damodaran. "Country Default Spreads and Risk Premiums." (http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html, accessed 17 September 2018).

[50] US Department of the Treasury. "Daily Treasury Yield Curve Rates." (https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2018)

Thus, the nominal CRP is 5.59 percent – 2.84 percent = **2.75 percent**.

**Nominal cost of equity**

Inputting the nominal values derived above results in a nominal cost of equity of 26.5 percent, calculated as follows:

$$\text{cost of equity (nominal)} = 2.84\% + 3.02 \times (5.08\% + 2.75\%) = 26.5\%$$

**Real cost of equity**

To estimate the real cost of equity, we take the nominal US dollar cost of equity and convert it to real terms, with expected United States inflation over the 5-year period, as follows. This matches the approach that the OUR applied in 2013:[51]

$$\text{cost of equity (real)} = \frac{\text{cost of equity (nominal)} - \textit{expected inflation}}{1 + \textit{expected inflation}}$$

Projected inflation is computed to be 2.1 percent, which is the difference between average, monthly yields on 5-year US Treasury bonds and the inflation indexed, 5-year Treasury bonds as at May 2018.

$$\text{cost of equity (real)} = \frac{26.5\% - 2.1\%}{1 + 2.1\%} = 23.9\%$$

The real cost of equity is calculated to be **23.9 percent**.

### 5.5.3 Return on equity

As show in Table 5.12, NWC's return on equity of JMD2,298,059,066 is calculated by multiplying its equity base (JMD9,614,021,000) by its cost of equity (23.9 percent).

**Table 5.12: Return on Equity in Revenue Requirement**

| | Water | Sewerage | Total |
|---|---|---|---|
| Equity Base (JMD '000s) | 6,984,002 | 2,630,019 | 9,614,021 |
| Cost of Equity in Real Terms | 23.9% | 23.9% | 23.9% |
| **Return on Equity (JMD '000s)** | **1,669,400** | **628,659** | **2,298,059** |

Source: Table 5.9. The National Water Commission. "Financial Statements: Commission Statement of Financial Position", 11, 55, 78, 79. 31 March 2018

In the 2013 Determination Notice, the OUR added taxes to NWC's return on equity. Taxes need to be added to the return on equity as NWC would need to pay taxes on its profits.

To calculate taxes, we use the formulas described below. As shown in (a), taxes are subtracted from pre-tax profits to obtain post-tax profits. As shown in (b), taxes are equal to 33.3 percent of pre-tax profits because NWC pays a tax rate of 33.3 percent.[52] Equations (c) through (h) are derived using algebra. This results in pre-tax profits of JMD3,447,088,599—as shown in (g)—and taxes of JMD1,149,029,533—as shown in (h).

a) Pre-tax profits – Taxes = Post-tax profits

[51] OUR. "National Water Commission Review of Rates Determination Notice", 78-79. 1 October 2013.

[52] OUR. "National Water Commission Review of Rates Determination Notice", 55. 1 October 2013.

b) Taxes = 33.3% * Pre-tax profits

c) Pre-tax profits – (33.3% * Pre-tax profits) = Post-tax profits

d) (1 – 33.3%) * Pre-tax profits = Post-tax profits

e) 66.7% x Pre-tax profits = Post-tax profits

f) Pre-tax profits = Post-tax profits / 66.7%

g) Pre-tax profits = $\frac{\text{JMD2,298,059,066}}{66.7\%}$ = JMD3,447,089,599

h) Taxes = Pre-tax profits * 33.3% = JMD3,447,089,599 x 33.3% = JMD1,149,029,533

As shown in Table 5.13, NWC's post-tax return on equity of JMD2,298,059,066 is calculated by multiplying its equity base (JMD9,614,021,000) by its cost of equity (23.9 percent). Taxes that would need to be paid on NWC's pre-tax profit, is JMD1,149,029,533. This means NWC's pre-tax return on equity is JMD2,298,059,066 + JMD1,149,029,533, or JMD3,447,088,599.

**Table 5.13: Return on Equity and Taxes in Revenue Requirement**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Equity Base | 6,984,002 | 2,630,019 | 9,614,021 |
| Cost of Equity in Real Terms | 23.9% | 23.9% | 23.9% |
| Post-tax Return on Equity | 1,669,400 | 628,659 | 2,298,059 |
| Taxes | 834,700 | 314,329 | 1,149,030 |
| **Pre-Tax Return on Equity** | **2,504,100** | **942,988** | **3,447,089** |

Source: Table 5.12.

## 5.6 NWC's Revenue Requirement

Table 5.14 shows NWC's revenue requirement as a sum of the items discussed above. Adding together the components of operating expenses, depreciation and amortization, loan interest, return on equity, and taxes gives a revenue requirement of JMD37,916,611,419 billion. Of this, JMD29,116,751,698 is the revenue requirement for water services, and JMD8,799,859,721 is the revenue requirement for sewerage services.

**Table 5.14: NWC's Revenue Requirement**

| Building Block | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Operating Expenses | 21,102,438 | 5,781,848 | 26,884,286 |
| Depreciation and Amortization | 3,798,586 | 1,430,463 | 5,229,049 |
| Loan Interest | 1,711,627 | 644,561 | 2,356,187 |
| Return on Equity | 1,669,400 | 628,659 | 2,298,059 |
| Taxes | 834,700 | 314,329 | 1,149,030 |

| Building Block | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| **Total Revenue Requirement** | **29,116,752** | **8,799,860** | **37,916,611** |

# 6 Tariffs Required for Full Cost Recovery

This section presents the tariffs that would be required for NWC to meet its revenue requirement described in Section 4.9.3. It shows how water tariffs would need to increase by 50 percent and sewerage tariffs would need to increase by 72 percent. However, this would not be affordable for poor or middle-class customers. Given this, NWC does not propose increasing tariffs to the levels required for full cost recovery.

## 6.1 Adjusting Revenue Requirement for Non-Tariff Revenue

As shown in Table 5.14, NWC's revenue requirement for full cost recovery is JMD37.9 billion, of which JMD29.1 billion is attributed to providing water services and JMD8.8 billion is attributed to providing sewerage services.

In setting tariffs, adjustments should be made to the revenue requirement to account for revenue from 'other' sources (bulk water, new installations, reconnections, and cesspool). The adjusted revenue requirement will be the revenue required from water and sewerage services, including service charges.

In the historical test year, other revenue was JMD0.5 billion,[53] as shown in the Supplementary Information of NWC's Financial Statements and summarized in Table 6.1.

**Table 6.1: Breakdown of Other Revenue**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Bulk water | 49,862 | - | 49,862 |
| New installations | 98,007 | - | 98,007 |
| Reconnections | 288,527 | - | 288,527 |
| Cesspool & other sewerage | - | 16,040 | 16,040 |
| Net of late payment fee and early payment initiative | 73,393 | 23,699 | 97,092 |
| **Total** | **509,789** | **39,739** | **549,528** |

Source: NWC. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I (page 69).

As Table 6.2 shows, the adjusted revenue requirement is JMD37.4 billion, which is calculated by deducting the JMD0.5 billion of expected other revenue from the total revenue requirement of JMD37.9 billion.

**Table 6.2: Adjusted Revenue Requirement**

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Revenue requirement for full cost recovery | 29,116,752 | 8,799,860 | 37,916,611 |

[53] NWC. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I (page 69).

| | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Adjustments to account for expected revenue from bulk water, new installations, reconnections, and cesspool | (509,789) | (39,739) | (549,528) |
| **Adjusted revenue requirement from water and sewerage services, including water service charges** | **28,606,963** | **8,760,121** | **37,367,083** |

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69).

## 6.2 Comparison of Revenue Requirement to Test Year Revenue

NWC's test year revenue from tariffs is JMD26.9 billion. JMD21.2 billion is from water services (including service charges) and JMD5.7 billion is from sewerage services, as shown in Table 6.3.

**Table 6.3: NWC's Historic Test Year Revenue from Water and Sewerage Services**

| Operating Revenue | Water (JMD '000s) | Sewerage (JMD '000s) | Total (JMD '000s) |
|---|---|---|---|
| Water | 16,923,871 | - | 16,923,871 |
| Sewerage | - | 5,464,715 | 5,464,715 |
| Service charge | 3,676,527 | - | 3,676,527 |
| Price adjustment mechanism | 609,824 | 196,912 | 806,736 |
| **Total** | **21,210,222** | **5,661,627** | **26,871,849** |

Source: Table 5.14, Table 6.1.

Given an adjusted revenue requirement of JMD37.4 billion and historic test year revenue of JMD26.9 billion, NWC's revenue from water and sewerage services would need to rise by 39 percent on average to cover its full cost of service. Revenue from sewerage services would need to rise by a higher percentage (55 percent) than revenue from water services (35 percent), as shown in Table 6.4.

**Table 6.4: Required Increase in Revenue from Water and Sewerage Services**

| | Water | Sewerage | Total |
|---|---|---|---|
| Revenue requirement from water and sewerage services (JMD '000s) | 28,606,963 | 8,760,121 | 37,367,083 |
| Historic test year revenue from water and sewerage services (JMD '000s) | 21,210,222 | 5,661,627 | 26,871,849 |
| Shortfall (JMD '000s) | 7,396,741 | 3,098,494 | 10,495,234 |
| **Required increase in revenue from water and sewerage services (%)** | **35%** | **55%** | **39%** |

Source: Table 6.2; Table 6.3.

## 6.3 Effect of Price Elasticity of Demand

Price elasticity of demand means that consumers are likely to reduce their consumption when the price rises. This results in a lower volume of sales, which means that tariffs would need to rise by more than the required increased in revenue for NWC to cover its costs.

The price elasticity of demand for water supply in Jamaica has not been studied, so NWC must rely on international studies for estimates. A World Bank report from 2009 found that price elasticity of demand in developing countries ranges from -0.3 to -0.6, which indicates that for every 1 percent increase in tariffs, consumption is expected to fall by 0.3 percent to 0.6 percent.[54] An older study (1997) that focused on the United States found a wider range of price elasticities, with 90 percent of estimates between -0.02 and -0.75.[55]

This submission assumes a price elasticity of demand for water supply services of -0.2, which indicates that for every 1 percent increase in tariffs, consumption is expected to fall by 0.2 percent. We took a number at the low end of the ranges presented by the studies to be conservative, to ensure we do not overstate the price elasticity effect, which could have the negative impact of tariffs being set higher than necessary.

## 6.4 Average Tariff Increases Required to Meet Revenue Requirement

Given the anticipated decline in consumption, the average volumetric water tariff would need to rise by 50 percent and the average volumetric sewerage tariff would need to rise by 72 percent (see Table 6.5). How the inputs in Table 6.5 were derived is described below.

**Table 6.5: Comparison of Current and Required Revenue, Average Tariff, and Consumption**

| | Test Year | | Required | |
|---|---|---|---|---|
| | Water* | Sewerage | Water* | Sewerage |
| Revenue (JMD '000s) | 17,424,860 | 5,661,627 | 23,501,514 | 8,760,121 |
| % Change in Revenue | N/A | N/A | 35% | 55% |
| Average Tariff (JMD/ 1,000 IG) | 909 | 972 | 1,362 | 1,671 |
| % Change in Average Tariff | N/A | N/A | 50% | 72% |
| Consumption (1,000 IG) | 19,160,703 | 5,822,343 | 17,252,708 | 5,242,563 |
| % Change in Consumption | N/A | N/A | -10% | -10% |

*Excluding revenue from service charges.

Source: See Table 6.4, Table 6.6, Table 6.7, and Table 6.8.

To obtain the JMD17.4 billion of revenue from volumetric water charges in the test year, revenue from volumetric water charges as reported on NWC's financial statements (JMD16.9

[54] Nauges, Ce´line and Whittington, Dale. "Estimation of Water Demand in Developing Countries: An Overview." The World Bank Research Observer, vol. 25, no. 2 (August 2010).

[55] Espey, M., Espey, J., and Shaw, W.D. "Price elasticity of residential demand for water: A meta-analysis." Water Resources Research, Vol. 33, No. 6. Pages 1369-1364, June 1997.

billion) has been adjusted for Price Adjustment Mechanism (PAM), as shown in Table 6.6. Because the ratio of revenue from volumetric water charges to volumetric sewerage charges is 72 percent to 18 percent, the reported water revenue (JMD16.9 billion) can be adjusted by adding 72 percent of reported PAM revenue (JMD0.5 billion) to obtain an adjusted water revenue of JMD17.4 billion. Similarly, the reported service charge (JMD3.7 billion) can be adjusted by adding 18 percent of reported PAM revenue (JMD0.1 billion) to obtain an adjusted service charge revenue of JMD3.8 billion.

**Table 6.6: Adjustment of Test Year Water Revenue**

| Revenue Category | Test Year Revenue (JMD '000s) | % Water Revenue to Service Revenue | PAM Reallocation (JMD '000s) | PAM-Adjusted Test Year Revenue (JMD '000s) |
|---|---|---|---|---|
| Water | 16,923,871 | 72% | 500,989 | 17,424,860 |
| Service charge | 3,676,527 | 18% | 108,835 | 3,785,362 |
| Price adjustment mechanism | 609,824 | - | - | - |
| **Total** | **21,210,222** | **100%** | **609,824** | **21,210,222** |

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69).

Based on the PAM-adjusted revenue of JMD17.4 billion and water consumption of 19.2 billion imperial gallons (IG) in the test year, the average water tariff in the test year is JMD909/1,000 IG.

To calculate the average water tariff increase required, projected revenue from service charges should be deducted from projected revenue from water services. To calculate projected revenue from service charges, NWC takes the adjusted test year revenue from service charges (JMD3.8 billion) and applies the 35 percent increase in revenue required. This gives projected revenue from service charges of JMD5.1 billion.

This projected revenue from service charges (JMD5.1 billion) is deducted from the revenue requirement from water services (JMD28.6 billion) to obtain the revenue requirement from volumetric water charges (JMD23.5 billion).

Table 6.7 shows how the average water tariff increase required can be calculated based on the revenue requirement from water tariffs. A 50 percent increase in water tariffs (from JMD909/1,000IG to JMD1,362/ 1,000IG), with a corresponding 10 percent decrease in water consumption (from 19.2 billion IG to 17.3 billion IG), would allow NWC to achieve a 35 percent increase in revenue from volumetric water charges (from JMD17.4 billion to JMD23.5 billion).

**Table 6.7: Average Increase in Water Tariffs Required**

| | Test Year | Required | % Change |
|---|---|---|---|
| Revenue (JMD 1,000) | 17,424,860 | 23,501,514 | 35% |
| Consumption (IG 1,000) | 19,160,703 | 17,252,708 | -10% |
| **Average Water Tariffs** | **909** | **1,362** | **50%** |

Source: See Table 6.7. Consumption data from NWC records.

Table 6.8 shows that the average sewerage tariff needs to increase by 72 percent, from JMD972/1,000 IG to JMD1,671/ 1,000 IG. This is the tariff that is required to generate the revenue requirement of JMD8.8 billion, after a 10 percent decrease in consumption from 5.8 billion IG to 5.2 billion IG.

**Table 6.8: Average Increase in Sewerage Tariffs Required**

| | Test Year | Required | % Change |
|---|---|---|---|
| Revenue (JMD 1,000) | 5,661,627 | 8,760,121 | 55% |
| Consumption (IG 1,000) | 5,822,343 | 5,242,563 | -10% |
| **Average Sewerage Tariffs** | **972** | **1,671** | **72%** |

Source: See Table 6.7 and Table 5.14. Consumption data from NWC records.

## 6.5 Tariff Schedule that is Needed to Meet the Full Cost Recovery Revenue Requirement

Table 6.9 compares NWC's current rates to the rates it would need to achieve full cost recovery if it keeps the existing tariff structure. The required rates are derived by applying a 50 percent increase to current water rates and a 72 percent increase to current sewerage tariffs.

**Table 6.9: Comparison of Current Rates to Rates Required for Full Cost Recovery**

| Customer Category and Block | Current Rates (JMD/1,000IG) | | Rates Required for Full Cost Recovery (JMD/1,000IG) | |
|---|---|---|---|---|
| | Water | Sewerage | Water | Sewerage |
| **Residential** | | | | |
| 0IG to 3,000IG | 471 | 428 | 706 | 735 |
| 3,000IG to 6,000IG | 831 | 754 | 1,245 | 1,296 |
| 6,000IG to 9,000IG | 897 | 815 | 1,344 | 1,400 |
| 9,000IG to 12,000IG | 1,146 | 1,040 | 1,716 | 1,787 |
| 12,000IG to 20,000IG | 1,427 | 1,295 | 2,137 | 2,225 |
| Over 20,000 IG | 1,836 | 1,667 | 2,751 | 2,864 |
| **Commercial** | 1,768 | 1,605 | 2,648 | 2,757 |
| **Condominium** | 877 | 796 | 1,314 | 1,368 |
| **School** | 707 | 642 | 1,059 | 1,103 |

Source: NWC. "Tariff" (https://www.nwcjamaica.com/Rates, accessed 17 September 2018).

Table 6.10 compares NWC's current service charges to the service charges it would need to achieve full cost recovery if it keeps the existing tariff structure. The required rates are derived by applying a 35 percent increase to applied to all service charges.

**Table 6.10: Comparison of Current Service Charges to Service Charges Required for Full Cost Recovery**

| Service Charge Category Based on Connection Size | Current Charges (JMD/Month) | Charges Required for Full Cost Recovery (JMD/Month) |
|---|---|---|
| 5/8 inch/15mm | 830 | 1,120 |
| 3/4 inch/20mm | 1,700 | 2,290 |
| 1 inch/25mm | 2,220 | 2,990 |
| 1 1/4 inch/30mm | 4,180 | 5,640 |
| 1 1/2 inch/40mm | 4,180 | 5,640 |
| 2 inch/50mm | 5,920 | 7,980 |
| 3 inch/75mm | 10,750 | 14,500 |
| 4 inch/100mm | 17,370 | 23,430 |
| 6 inch/150mm | 26,460 | 35,690 |

Source: NWC. "Tariff" (https://www.nwcjamaica.com/Rates, accessed 17 September 2018).

## 6.6 Impact on Customers of Applying the Required Tariff Increase to the Current Tariff Structure

NWC compared the affordability of residential water bills under current tariffs and full cost recovery tariffs. This section presents NWC's analysis for poor households consuming a basic quantity for water, and middle-class households consuming an average quantity of water.

### 6.6.1 Poor households

Table 6.11 compares the affordability of water bills under current and cost recovery tariffs for a household of five people at the bottom income quintile in Jamaica, consuming a basic needs volume of water. Jamaica's Draft National Water Sector Policy defines a basic needs volume of water as 50 liters per capita per day (lpcd). The Draft National Water Sector Policy was approved by Cabinet in April 2018 and is scheduled to be tabled in Parliament.[56] Consumption of 50lpcd is equivalent to 1,650IG per month for a household of five people.

Table 6.11 shows that full cost recovery tariffs are not affordable. At JMD2,651/month, the water bill would be alone would be 6.3 percent of total household expenditure, materially exceeding the affordability benchmark of 5 percent. Further, this is a 47 percent increase compared to the current bill.

**Table 6.11: Full Cost Recovery Tariffs Are Not Affordable for Poor Households**

| | Current Tariffs (JMD) | Tariffs Required for Full Cost Recovery (JMD) | Percentage Increase from Current to Required Tariffs (%) |
|---|---|---|---|
| Water charges | 778 | 1,165 | 50% |
| Service charge | 830 | 1,120 | 35% |
| PAM* | 46 | - | N/A |
| X-Factor | (103) | - | N/A |

[56] Ministry of Economic Growth and Job Creation. "Draft Water Sector Policy and Implementation Plan 2018", 50.

| | Current Tariffs (JMD) | Tariffs Required for Full Cost Recovery (JMD) | Percentage Increase from Current to Required Tariffs (%) |
|---|---|---|---|
| K-Factor | 248 | 366 | 47% |
| **Total water bill** | **1,799** | **2,651** | **47%** |
| Total expenditure (bottom income quintile) | 41,838 | 41,838 | N/A |
| **Total water bill as percentage of total expenditure** | **4.3%** | **6.3%** | **47%** |

Source: Total expenditure for households in bottom income quintile derived from data from Jamaica Survey of Living Conditions, 2015 (Standard Tables, Table B-5, page 12).

*From base tariffs, set in January 2018, until April 2018.

Statistical Institute of Jamaica. "Consumer Price Index". (http://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx, accessed 13 September 2018)

NWC Electricity Bills.

Bank of Jamaica. "Historical Exchange Rates." (http://www.boj.org.jm/foreign_exchange/fx_historical_rates.php, accessed 13 September 2018).

### 6.6.2 Average households

Table 6.12 compares the affordability of water bills under current and cost recovery tariffs for a household of five people in the medium income quintile in Jamaica, consuming an average volume of water (125lpcd). Consumption of 125lpcd is equivalent to 4,124 IG per month for a household of five people.

Table 6.12 shows that full cost recovery tariffs are not affordable. At JMD5,381/month, the water bill would be alone would be 5.3 percent of total household expenditure, above the affordability benchmark of 5 percent. Further, this is a 51 percent increase compared to the current bill.

**Table 6.12: Full Cost Recovery Tariffs Are Not Affordable for Average Households**

| | Current Tariffs (JMD) | Tariffs Required for Full Cost Recovery (JMD) | Percentage Increase from Current to Required Tariffs (%) |
|---|---|---|---|
| Water charges | 2,349 | 3,519 | 50% |
| Service charge | 830 | 1,120 | 35% |
| PAM | 91 | - | N/A |
| X-Factor | (204) | - | N/A |
| K-Factor | 491 | 742 | 51% |
| **Total water bill** | **3,557** | **5,381** | **51%** |
| Total expenditure (medium income quintile) | 101,542 | 101,542 | N/A |
| **Total water bill as percentage of total expenditure** | **3.5%** | **5.3%** | **51%** |

Source: Total expenditure for households in middle income quintile derived from data from Jamaica Survey of Living Conditions, 2015. (Standard Tables, Table B-5, page 12).

From base tariffs, set in January 2018, until April 2018.

Statistical Institute of Jamaica. "Consumer Price Index". (http://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx, accessed 13 September 2018)

NWC Electricity Bills.

Bank of Jamaica. "Historical Exchange Rates." (http://www.boj.org.jm/foreign_exchange/fx_historical_rates.php, accessed 13 September 2018).

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NWC does not recommend applying the required increase to the existing tariff structure, given the hardship that this would impose on households, especially poor households. Section 8 presents a tariff request which aims to ameliorate these impacts. However, before presenting the proposed tariff structure in Section 8, we explain the reasons for the large increase required for full cost recovery (Section 7).

# 7 Reasons for Large Gap Between Revenue Requirement and Historic Test Year Revenue

The gap between NWC's revenue requirement for full cost recovery (JMD37.9 billion) and NWC's historic test year revenue from water and sewerage services (JMD26.9 billion) is 41 percent. Two key factors each explain about half of the gap.

First, NWC's cost of service increased by 45 percent over the tariff period (from JMD26.2 billion to JMD37.9 billion). However, the PAM increased tariffs by just 21 percent. This means that the additional revenue NWC earned due to PAM adjustments was less than half what was required to cover the increase in its cost of service.

Second, the tariff increase applied in October 2013 (16 percent on average) was set too low to cover NWC's 2013 revenue requirement (JMD26.2 billion). To meet the revenue requirement, tariffs should have been increased by 38 percent on average, and the X-Factor should have been reduced to 0 percent.

These two factors are explained below.

## 7.1 Increase in the Cost of Service

Table 7.1 shows the PAM-compensated increase in NWC's cost of service from October 2013 to March 2018. The PAM-compensated increase (JMD5.0 billion, or 19 percent) is the weighted average increase of all cost of service building blocks based on changes in their respective PAM indexes.

**Table 7.1: Projected Revenue Requirement Based on PAM-Compensated Increase**

| Building Block | 2013 Revenue Requirement (JMD '000s) | PAM-Compensated Increase | | Projected Revenue Requirement Based on PAM-Compensated Increase (JMD '000s) |
|---|---|---|---|---|
| | | JMD '000s | % | |
| Operating expenses excluding electricity | 13,234,926 | 3,109,450 | 23% | 16,344,376 |
| Electricity | 6,560,771 | 533,870 | 8% | 7,094,641 |
| Loan interest | 930,326 | 203,692 | 22% | 1,134,018 |
| Foreign exchange losses | - | - | - | - |
| Depreciation | 3,016,686 | 660,493 | 22% | 3,677,179 |
| Pre-tax return on equity | 2,420,522 | 529,965 | 22% | 2,950,487 |
| **Total** | **26,163,231** | **5,037,469** | **19%** | **31,200,701** |

Source: Statistical Institute of Jamaica. "Consumer Price Index". (http://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx, accessed 13 September 2018)

NWC Electricity Bills.

Bank of Jamaica. "Historical Exchange Rates." (http://www.boj.org.jm/foreign_exchange/fx_historical_rates.php, accessed 13 September 2018).

OUR. "National Water Commission Review of Rates: Determination Notice", 83. 1 October 2013.

Table 7.2 shows the actual increase in NWC's cost of service from October 2013 to March 2018.

**Table 7.2: Actual Increase in NWC's Revenue Requirement from 2013 to 2018**

| Building Block | 2013 Revenue Requirement (JMD '000s) | 2018 Revenue Requirement (JMD '000s) | Actual Increase | |
|---|---|---|---|---|
| | | | JMD '000s | % |
| Operating expenses excluding electricity | 13,234,926 | 19,939,568 | 6,704,642 | 51% |
| Electricity | 6,560,771 | 6,924,413 | 363,642 | 6% |
| Loan interest | 930,326 | 1,282,301 | 351,975 | 38% |
| Foreign exchange losses | - | 1,073,887 | 1,073,887 | N/A |
| Depreciation | 3,016,686 | 5,229,049 | 2,212,363 | 73% |
| Pre-tax return on equity | 2,420,522 | 3,447,089 | 1,026,566 | 42% |
| **Total** | **26,163,231** | **37,896,306** | **11,733,075** | **45%** |

Source: OUR. "National Water Commission Review of Rates: Determination Notice", 83. 1 October 2013. Table 5.14.

Table 7.3 compares the PAM-compensated increase in NWC's cost of service from October 2013 to March 2018 to the actual increase. The actual increase (JMD11.8 billion, or 45 percent) is more than twice the PAM-compensated increase (JMD5.0 billion, or 19 percent).

The discrepancy is mostly due to higher increases in operating expenses (excluding electricity), loan interest, and depreciation; as well as the inclusion of foreign exchange losses, an implicit cost of NWC's debt, into the cost of service calculation.

**Table 7.3: PAM-Compensated and Actual Change in Cost of Service Building Blocks Over Tariff Period**

| Building Block | PAM-Compensated Change over the Period | | Actual Change over the Period | | Comments |
|---|---|---|---|---|---|
| | JMD '000s | % | JMD '000s | % | |
| Operating expenses excluding electricity | 3,109,450 | 23% | 6,704,642 | 51% | See Table 7.4 for breakdown |

| Building Block | PAM-Compensated Change over the Period | | Actual Change over the Period | | Comments |
|---|---|---|---|---|---|
| | JMD '000s | % | JMD '000s | % | |
| Electricity | 533,870 | 8% | 363,642 | 6% | Actual change is roughly in line with PAM-compensated change |
| Loan interest | 203,692 | 22% | 351,975 | 38% | Greater change due to increase in outstanding loans |
| Foreign exchange losses | - | 22% | 1,073,887 | N/A | Foreign exchange losses were not included in 2013 cost of service (see Section 5.4 for rationale) |
| Depreciation | 660,493 | 22% | 2,212,363 | 73% | Greater change due to revaluation of assets |
| Pre-tax return on equity | 529,965 | 22% | 1,026,566 | 42% | Change due to increase in cost of equity, despite lower equity base |
| **Total** | **5,037,469** | **19%** | **11,733,075** | **45%** | |

Source: Table 7.1 and Table 7.2.

NWC's loan interest increased by 38 percent instead of 22 percent. This is due to an increase in NWC's outstanding loan balance, which means more interest is paid. NWC's average outstanding loan balance increased from JMD20.2 billion to JMD38.5 billion,[57] a 90 percent increase.

Depreciation increased by 73 percent instead of 22 percent due to NWC's revaluation of assets in 2013. The revaluation, approved by NWC's auditors, led to a significant increase in the value of NWC's fixed assets, on which depreciation is applied.

Foreign exchange losses were not included in NWC's 2013 cost of service. As explained in Section 5.4, foreign exchange losses are an implicit cost of debt and should be included in NWC's cost of service.

### 7.1.1 Breakdown of increase in operating expenses

Table 7.4 compares the PAM-compensated increase in NWC's operating expenses from October 2013 to March 2018 to the actual increase. NWC's three largest operating expenses are salaries, wages, and related costs; repairs and maintenance; and administration. Increases in each of these expense categories were more than double the PAM-compensated increase over the period (23 percent). Soapberry costs have also more than doubled the PAM-

[57] National Water Commission. "Financial Statements March 31, 2018", 45. National Water Commission. "Financial Statements March 31, 2013", 29.

compensated increase, due to an increase in CWTC tariffs. Other operating expenses have increased at a lower rate than Consumer Price Index (CPI).

**Table 7.4: PAM-Adjusted and Actual Change in Operating Expense Components Over Tariff Period**

| Operating Expense Components | PAM-Compensated Change over the Period | | Actual Change over the Period | | Comments |
|---|---|---|---|---|---|
| | JMD '000s | % | JMD '000s | % | |
| Salaries, wages and related costs | 1,430,453 | 23% | 2,944,512 | 48% | See Table 7.5 for breakdown |
| Repairs and maintenance | 537,706 | 23% | 1,231,635 | 54% | See Table 7.6 for breakdown |
| Administration | 735,866 | 23% | 1,987,554 | 63% | See Table 7.7 for breakdown |
| Soapberry cost | 228,246 | 23% | 468,759 | 48% | Due to increase in CWTC tariffs |
| Other operating expenses | 177,179 | 23% | 72,182 | 10% | Increase lower than CPI |
| **Total** | **3,109,450** | **23%** | **6,704,642** | **51%** | |

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended 31 March 2018", I. (page 69).

Table 7.3, Table 7.5, Table 7.6, Table 7.7

OUR. "National Water Commission Review of Rates: Determination Notice", 83, 92. 1 October 2013.

### Salaries, wages, and related costs

As summarized in Table 7.5, salaries, wages, and related costs increased by 48 percent (JMD2.9 billion) instead of 23 percent (JMD1.4 billion). This is mainly due to the larger than PAM-compensated increase in pension costs of JMD1.1 billion. This was caused by changes in actuarial valuations. Another reason is the larger than PAM-compensated increase in allowances of JMD0.4 billion. This is because NWC implemented a policy of reimbursing staff for taxi fare incurred due to overtime work; and because taxi, meal, and lunch allowances have increased faster than CPI over the period.

**Table 7.5: Comparison of PAM-Compensated Increase and Actual Increase in Salaries, Wages, and Related Costs**

| Item | Value in 2013 Revenue Requirement (JMD '000s) | PAM-Compensated Increase (JMD '000s) | Value in 2018 Revenue Requirement JMD '000s) | Actual Increase (JMD '000s) | Difference between Actual Increase and PAM-Compensated Increase (JMD '000s) |
|---|---|---|---|---|---|
| Salaries and wages | 2,740,320 | 643,818 | 3,274,677 | 534,357 | -109,461 |

| Item | Value in 2013 Revenue Requirement (JMD '000s) | PAM-Compensated Increase (JMD '000s) | Value in 2018 Revenue Requirement JMD '000s) | Actual Increase (JMD '000s) | Difference between Actual Increase and PAM-Compensated Increase (JMD '000s) |
|---|---|---|---|---|---|
| Allowances | 1,256,181 | 295,131 | 1,998,955 | 742,774 | 447,643 |
| Pensions | 1,519,637 | 357,028 | 3,006,734 | 1,487,097 | 1,130,069 |
| Other | 572,377 | 134,476 | 752,661 | 180,284 | 45,808 |
| **Total** | **6,088,515** | **1,430,453** | **9,033,027** | **2,944,512** | **1,514,059** |

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69).

Table 7.4

OUR. "National Water Commission Review of Rates: Determination Notice", 83, 92. 1 October 2013.

Statistical Institute of Jamaica. "Consumer Price Index". (http://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx, accessed 13 September 2018)

### Repairs and maintenance costs

Repairs and maintenance costs increased by 54 percent (JMD1.2 billion) instead of 23 percent (JMD0.5 billion). The increase in repairs and maintenance costs beyond the PAM-compensated increase is caused by plant and equipment costs increasing by JMD555 million more than the PAM-compensated increase (see Table 7.6).

Repairs and maintenance costs for three new, large projects are the main reason for JMD494 million, or 89 percent, of the additional increase. The three projects, and their respective repairs and maintenance costs, are:

- The Portmore Sewerage Project, which started operating in financial year 2017/2018 (JMD263 million)
- The Downtown Kingston Sewerage project (JMD175 million)
- The Hopewell and Kemps Hill wells (JMD56 million).

**Table 7.6: Comparison of PAM-Compensated Increase and Actual Increase in Repairs and Maintenance Costs**

| Item | Value in 2013 Revenue Requirement (JMD '000s) | PAM-Compensated Increase (JMD '000s) | Value in 2018 Revenue Requirement JMD '000s) | Actual Increase (JMD '000s) | Difference between Actual Increase and PAM-Compensated Increase (JMD '000s) |
|---|---|---|---|---|---|
| Plant and equipment costs | 414,480 | 97,379 | 1,066,416 | 651,936 | 554,557 |
| Other repairs and maintenance costs | 1,874,189 | 440,327 | 2,453,888 | 579,699 | 139,372 |
| **Total repairs and maintenance costs** | **2,288,669** | **537,706** | **3,520,304** | **1,231,635** | **693,929** |

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69).

Table 7.4

OUR. "National Water Commission Review of Rates: Determination Notice", 83, 92. 1 October 2013.

Statistical Institute of Jamaica. "Consumer Price Index". (http://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx, accessed 13 September 2018)

### Administration costs

Administration costs increased by 63 percent (JMD2.0 billion) instead of 23 percent (JMD0.7 billion), as shown in Table 7.7. Within administration costs, the largest increases come from consultancy fees and security services. The increase in consultancy fees is JMD0.4 billion more than the PAM-compensated increase; the increase in security services costs is JMD0.1 billion more than the PAM-compensated increase.

These increases can be explained as follows:

- NWC now pays JMD0.4 billion in consultancy fees to Miya for the NRW Co-Management Programme. The NRW programme started after 2013, so this cost was not captured in the historic test year cost of service
- Security services costs have increased by JMD0.1 billion more than the PAM-compensated increase, as rates that NWC pays for security have increased faster than CPI over the period.

**Table 7.7: Comparison of PAM-Compensated Increase and Actual Increase in Administration Expenses**

| Item | Value in 2013 Revenue Requirement (JMD '000s) | PAM-Compensated Increase (JMD '000s) | Value in 2018 Revenue Requirement JMD '000s) | Actual Increase (JMD '000s) | Difference between Actual Increase and PAM-Compensated Increase (JMD '000s) |
|---|---|---|---|---|---|
| Consultancy fees | 55,559 | 13,053 | 472,822 | 417,263 | 404,210 |
| Security services | 202,945 | 47,680 | 336,009 | 133,064 | 85,384 |
| Other Admin* Costs | 2,873,604 | 675,132 | 4,310,831 | 1,437,227 | 762,095 |
| **Total Admin* Costs** | **3,132,108** | **735,866** | **5,119,662** | **1,987,554** | **1,251,688** |

*Admin = Administration

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69).

Table 7.4

OUR. "National Water Commission Review of Rates: Determination Notice", 83, 92. 1 October 2013.

Statistical Institute of Jamaica. "Consumer Price Index". (http://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx, accessed 13 September 2018)

Soapberry costs, which are approved by the OUR, have increased significantly from JMD1.0 billion to JMD1.4 billion since 2013. This is a 48 percent increase—more than twice as much as the PAM-compensated 23 percent change.

That NWC's cost of service increased about twice as much as the PAM adjustments accounts for about half of the discrepancy between historical test year revenue (excluding K-Factor) and the revenue requirement. This explains why NWC has covered a lower percentage of its cost of service over time.

However, NWC's revenue was below its cost of service even just after the tariff reset. In financial year 2014/2015, PAM-adjusted revenue was 79 percent of its cost of service.[58] To assess why this may be the case, NWC examined how the base rates for the 2013 to 2018 tariff period were set in the 2013 Determination Notice.

[58] Based on OUR calculated revenue in 2013 tariff determination, with adjustments for PAM up to April 2015.

## 7.2 Low Starting Tariffs in October 2013

In its 2013 Determination Notice, the OUR approved a 16 percent increase in tariffs on average.[59] The OUR calculated this increase by subtracting NWC's revenue in the historical test year (JMD22.5 billion) from NWC's revenue requirement (JMD26.2 billion), to obtain a revenue shortfall (JMD3.6 billion).[60] The revenue shortfall was then divided by revenue in the test year to obtain the percentage increase required.

In replicating the OUR's calculation, NWC obtained a required tariff increase of 38 percent on average (see Table 7.8). This increase was calculated using an input of JMD18.8 billion for revenue in the historical test year. This input was calculated by taking the actual audited operating revenue (net of PAM, K-Factor and X-Factor) for the financial year 2012/2013 (JMD18.6 billion) and adjusting for PAM from April 2013 to July 2013 (2 percent). Other revenue (from bulk water, new installations, reconnections, and cesspool) has been excluded from the revenue requirement and the revenue in the historical test year, as revenue from these sources are not generated from rates.

**Table 7.8: Comparison of OUR's and NWC's Calculations of Revenue in Historical Test Year for 2013 Tariff Determination**

| | Revenue Requirement (JMD billions) | Revenue in Historical Test Year* (JMD Billions) | Revenue Shortfall (JMD Billions) | Tariff Increase Needed (%) |
|---|---|---|---|---|
| OUR Calculation | 26.2 | 22.5 | 3.6 | 16% |
| NWC Calculation | 25.9 | 18.8 | 7.1 | 38% |

*Revenue in historical test year is equal to "the actual audited operating revenues for both water and sewerage services (net of PAM, K-Factor and X-Factor) for the financial year 2012/2013… [with] adjustments for changes in the PAM variable up to July of 2013".

Source: OUR. "National Water Commission Review of Rates: Determination Notice", 83. 1 October 2013.

[59] OUR. "National Water Commission Review of Rates: Determination Notice.", 13. 1 October 2013.

[60] OUR. "National Water Commission Review of Rates: Determination Notice.", 83. 1 October 2013.

# 8 Proposed Tariff Structure and Other Charges

NWC recognizes that the tariff increase required for full cost recovery would not be affordable to all its customers and accepts that NWC should earn a return on equity through efficiency improvements (instead of through a tariff increase). In addition, changes to the current tariff structure are needed to promote affordability and efficiency.

This section begins by setting out the criteria for the proposed tariff structure and other charges. Next, the revenue requirement (excluding the return on equity) is calculated and compared to test year revenue. Under this adjusted revenue requirement, revenue from water and sewerage services would need to rise by 26 percent on average (compared to 39 percent on average under the full cost recovery option, if return on equity were included).

Tariffs and other charges, and the rationale for them, are then presented by customer category. In addition to requesting revised rates, NWC is requesting changes to the residential and commercial tariff structures. The impact of the proposed tariffs on customer bills and affordability is also presented.

## 8.1 Criteria for Setting Proposed Tariff Structure and Other Charges

NWC proposes a tariff structure that meets the following criteria:

- The revenue generated covers NWC's operating expenses, loan interest, and depreciation, but not a return on equity; and is sufficient to cover NWC's cash needs
- Services are affordable, meaning a basic needs level of water consumption accounts for about 5 percent of expenditure for poor households; and average water consumption accounts for no more than 5 percent of expenditure for average households
- The structure is attractive to large users, encouraging them to stay on the system (or pay for standby capacity if they leave the system)
- The structure sends appropriate price signals, so as to preserve resources and deter waste
- Bill increases are kept relatively consistent across customer categories and consumption levels (except for low consumption residential users, whose bills will rise less than the bills for other customers).

## 8.2 Revenue Requirement Excluding the Return on Equity

NWC's proposed tariff structure would cover operating expenses, depreciation, and loan interest, but not a return on equity. Excluding the return on equity, NWC's revenue requirement is JMD34.5 billion, of which JMD26.6 billion is attributed to providing water services and JMD7.9 billion is attributed to providing sewerage services (see Table 8.1)

After adjusting for revenue from other sources, the revenue requirement is JMD33.9 billion, of which JMD26.1 billion is attributed to providing water services and JMD7.8 billion is attributed to providing sewerage services.

**Table 8.1: NWC's Revenue Requirement Excluding Return on Equity (JMD '000s)**

| Building Block | Water | Sewerage | Total |
|---|---|---|---|
| Operating Expenses | 21,102,438 | 5,781,848 | 26,884,286 |
| Depreciation and Amortization | 3,798,586 | 1,430,463 | 5,229,049 |
| Loan Interest | 1,711,627 | 644,561 | 2,356,187 |
| **Total Revenue Requirement** | **26,612,651** | **7,856,871** | **34,469,523** |
| Adjustments to account for expected revenue from bulk water, new installations, reconnections, and cesspool | (509,789) | (39,739) | (549,528) |
| **Revenue requirement (excluding return on equity) from water and sewerage services, including water service charges** | **26,102,862** | **7,817,132** | **33,919,995** |

Source: See Table 5.14 and Table 6.1.

## 8.3 Comparison of Revenue Requirement Excluding the Cost of Equity to Test Year Revenue

NWC's historic test year revenue from tariffs is JMD26.9 billion, of which JMD21.2 billion is from water and JMD5.7 billion from sewerage (see Table 6.3).

Given a revenue requirement (excluding return on equity) of JMD33.9 billion and historic test year revenue of JMD26.9 billion, NWC's revenue from water and sewerage services would need to rise by 26 percent on average. Revenue from sewerage services would need to rise by a higher percentage (38 percent) than revenue from water services (23 percent), as shown in Table 8.2.

**Table 8.2: Required Increase in Revenue from Water and Sewerage Services**

| | Water | Sewerage | Total |
|---|---|---|---|
| Revenue requirement (excluding return on equity) from water and sewerage services (JMD '000s) | **26,102,862** | **7,817,132** | **33,919,995** |
| Historic test year revenue from water and sewerage services (JMD '000s) | 21,210,222 | 5,661,627 | 26,871,849 |
| Shortfall (JMD '000s) | 4,892,640 | 2,155,505 | 7,048,146 |
| **Required increase in revenue from water and sewerage services (%)** | **23%** | **38%** | **26%** |

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I. (page 69.)

Table 6.3, Table 8.1.

## 8.4 Residential Tariffs

NWC proposes consolidating the six residential blocks into three residential blocks. The concept can be summarized as follows:

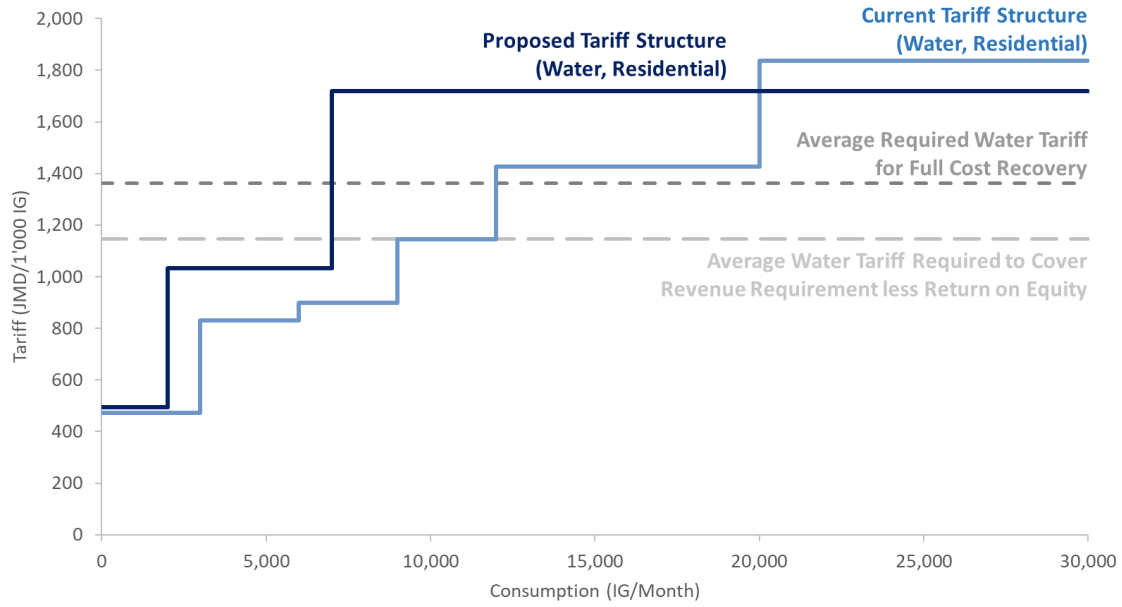
- The first block would apply up to the 'basic needs' level of consumption for an above average-sized household, with a rate set below average cost to ensure affordability for the poor
- The second block would apply to average levels of consumption, with a rate set near average cost
- The third block would apply to excess consumption, with a rate set above average cost to promote efficiency and deter waste.

In addition to achieving objectives of affordability and efficiency, consolidation from six blocks into three blocks would achieve administrative simplicity. Less complex bills will be more easily understood by customers, allowing them to better manage their water consumption and expenditure.

### 8.4.1 Residential tariffs for water services

Figure 8.1 compares the proposed residential tariff structure for water services (shown by the dark blue line) to the existing residential tariff structure for water services (shown by the light blue line). The average water tariff required for full cost recovery (JMD1,362/1,000IG) is shown by a dark gray dotted line. Below it, the average water tariff required to cover the revenue requirement without a return on equity (JMD1,147/1,000IG) is shown by a light gray dotted line.

**Figure 8.1: Comparison of Existing and Proposed Residential Tariffs for Water Services**




### Lifeline block

NWC proposes that the first block apply to consumption up to 2,000IG/month, instead of the current cap of 3,000IG/month. The cap of 2,000IG/month is proposed because it is just

sufficient to cover the 'basic needs' consumption (50lpcd) for a household of six people.[61] Six people consuming 50lpcd each would use 1,980IG/month.[62]

The average household size in the bottom income quintile is 4.3 people,[63] so setting the lifeline block at 2,000IG/month provides a reasonable safety margin to ensure that water remains affordable even for poor households who—because of household size or other reasons—have water needs greater than the average.

NWC proposes that the water rate for the lifeline block be set at JMD495/1,000IG, which is just 5 percent higher than the current rate. This is a low increase compared to the average required increase of 23 percent across all water tariffs. NWC is keeping the increase in this block low, to ensure affordability of water for its poorest customers.

*Affordability of the lifeline block for poor households*

Table 8.3 presents the affordability of water bills for typical households at the bottom income quintile in Jamaica, each consuming a basic needs volume of water. The entire consumption of each household would fall within the lifeline block, as that applies to consumption up to 2,000IG.

As shown in the fifth column, each household would face a 9 percent increase in their water bills. This increase is higher than the 5 percent increase in tariffs due to the impact of a revised X-Factor and K-Factor (see Section 8.11).

As shown in the rightmost column, for poor households of five people or more, the total water bill under proposed tariffs would be less than 5 percent of expenditure. However, for poor households of 4 people or less, the total water bill under proposed tariffs would be slightly[64] more than 5 percent of expenditure. This is primarily due to the high service charge. In NWC's judgment, this bill is still affordable.

**Table 8.3: Affordability of Water Bills for Basic Needs Consumption for Poor Households**

| Household Size | Consumption (IG) | Water Bill under Existing Tariffs (JMD) | Water Bill under Proposed Tariffs (JMD) | % Increase | Water Bill as % of Expenditure under Existing Tariffs | Water Bill as % of Expenditure under Proposed Tariffs |
|---|---|---|---|---|---|---|
| 4 | 1,320 | 1,625 | 1,767 | 9% | 4.9% | 5.3% |
| 5 | 1,650 | 1,799 | 1,957 | 9% | 4.3% | 4.9% |
| 6 | 1,980 | 1,973 | 2,146 | 9% | 3.9% | 4.3% |

[61] Ministry of Economic Growth and Job Creation. "Draft Water Sector Policy and Implementation Plan 2018", 50.

[62] 50 lpcd x 6 people = 300 liters per household per day. 300 x 30 days in a month = 9,000 liters per household per month. 9,000 divided by 4.54 liters per IG = 1,980 IG/month

[63] The Planning Institute of Jamaica and The Statistical Institute of Jamaica. "Jamaica Survey of Living Conditions, 2015." (Standard Tables, Table A-4, page 3). April 2017.

[64] Three tenths of one percent

Source: See sources in Table 8.4.

The Planning Institute of Jamaica and The Statistical Institute of Jamaica. "Jamaica Survey of Living Conditions, 2015." (Standard Tables, Table A-4, page 3). April 2017.

The inputs used to calculate the water bills and the percentage of expenditure spent on water are described below. Table 8.4 shows a breakdown of the calculation of the water bills—which include water tariffs, service charges, PAM, X-Factor, and K-Factor—for a household of five people.

**Table 8.4: Breakdown of Change in Water Bill for Poor Households of 5 People**

| Bill Component | Rates under Existing Tariffs (JMD/ 1,000IG) | Water Bill under Existing Tariffs (JMD) | Rates under Proposed Tariffs (JMD/ 1,000IG) | Water Bill under Proposed Tariffs (JMD) | % Increase in Bill |
|---|---|---|---|---|---|
| Water Tariff | 471 | 778 | 495 | 817 | 5% |
| Service Charge | 830 | 830 | 870 | 870 | 5% |
| PAM* | 2.73% | 46 | N/A | - | N/A |
| X-Factor | (6%) | (103) | 0% | - | N/A |
| K-Factor | 16% | 248 | 16% | 270 | 9% |
| **Total** | **N/A** | **1,799** | **N/A** | **1,957** | **N/A** |

*From base tariffs, set in January 2018, until April 2018.

Source: Statistical Institute of Jamaica. "Consumer Price Index". (http://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx, accessed 13 September 2018)

NWC Electricity Bills.

Bank of Jamaica. "Historical Exchange Rates." (http://www.boj.org.jm/foreign_exchange/fx_historical_rates.php, accessed 13 September 2018).

Household expenditure is derived from the Jamaica Survey of Living Conditions, 2015.[65] The survey provides average annual per capita expenditure for the bottom income quintile (JMD90,132/year). For the affordability calculations, this value is converted into average monthly per capita expenditure for the bottom income quintile (JMD7,511/month). This is calculated by dividing JMD90,132 by 12 months. The average per capita expenditure of JMD7,511/month is then multiplied by the number of people per household to obtain the average household expenditure per month. For instance, for a household of five people, the average household expenditure would be JMD37,555/month (JMD7,511/month multiplied by 5).

[65] Jamaica Survey of Living Conditions, 2015. (Standard Tables, Table B-5, page 12). Figure was adjusted for inflation from 2015 to 2018 using CPI data published by STATIN: Statistical Institute of Jamaica. "Consumer Price Index". (http://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx, accessed 13 September 2018).

The average per household expenditure of JMD37,555/month has been adjusted for inflation from 2015 up to April 2018 (11 percent).[66] This results in an inflation-adjusted average per household expenditure of JMD41,838/month. The inflation-adjusted household expenditure for poor households of four people is JMD33,471/month; inflation-adjusted expenditure for poor households of six people is JMD50,206/month.

**Average consumption block**

NWC proposes that the second block go from 2,000IG/month to 7,000IG/month. This is equivalent to the 40th percentile to the 94th percentile of current residential consumption. Table 8.5 presents average per capita consumption at the lower bound and upper bound of this block for various household sizes.

**Table 8.5: Range of Per Capita Consumption for Various Household Sizes Captured by Average Consumption Block**

| Household Size | Average Per Capita Consumption if Total Consumption is 2,000IG (Lower Bound of Block) | Average Per Capita Consumption if Total Consumption is 7,000IG (Upper Bound of Block) |
|---|---|---|
| 4 | 76lpcd | 265lpcd |
| 5 | 61lpcd | 212lpcd |
| 6 | 51lpcd | 177lpcd |

NWC proposes that the water rate for the average consumption block be set at JMD1,032/1,000IG, which is 10 percent below NWC's water average cost of service (excluding return on equity).

*Affordability of the proposed tariff structure for average households*

Table 8.6 presents the affordability of water bills for typical households in the medium income quintile in Jamaica, each consuming an average volume of water (125lpcd). As shown in the fifth column, each household would face increase of between 32 percent and 33 percent in their water bills. As shown in the rightmost column, the total water bill under proposed tariffs would be less than 5 percent of expenditure.

**Table 8.6: Affordability of Consumption for Average Households**

| Household Size | Consumption (IG) | Water Bill under Existing Tariffs (JMD) | Water Bill under Proposed Tariffs (JMD) | % Increase | Water Bill as % of Expenditure under Existing Tariffs | Water Bill as % of Expenditure under Proposed Tariffs |
|---|---|---|---|---|---|---|
| 4 | 3,300 | 2,789 | 3,713 | 33% | 3.4% | 4.6% |
| 5 | 4,124 | 3,558 | 4,701 | 32% | 3.5% | 4.6% |
| 6 | 4,950 | 4,324 | 5,689 | 32% | 3.5% | 4.7% |

[66] Statistical Institute of Jamaica. "Consumer Price Index". (http://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx, accessed 13 September 2018)

Source: See sources in Table 8.4.

The Planning Institute of Jamaica and The Statistical Institute of Jamaica. "Jamaica Survey of Living Conditions, 2015." (Standard Tables, Table A-4, page 3). April 2017.

### Excess consumption block

NWC proposes that the third block apply to excess consumption above 7,000IG/month, equivalent to the 94th percentile of current residential consumption. NWC proposes that the water rate for the block be set at JMD1,720/1,000IG, which is 50 percent above NWC's average water cost of service (excluding return on equity).

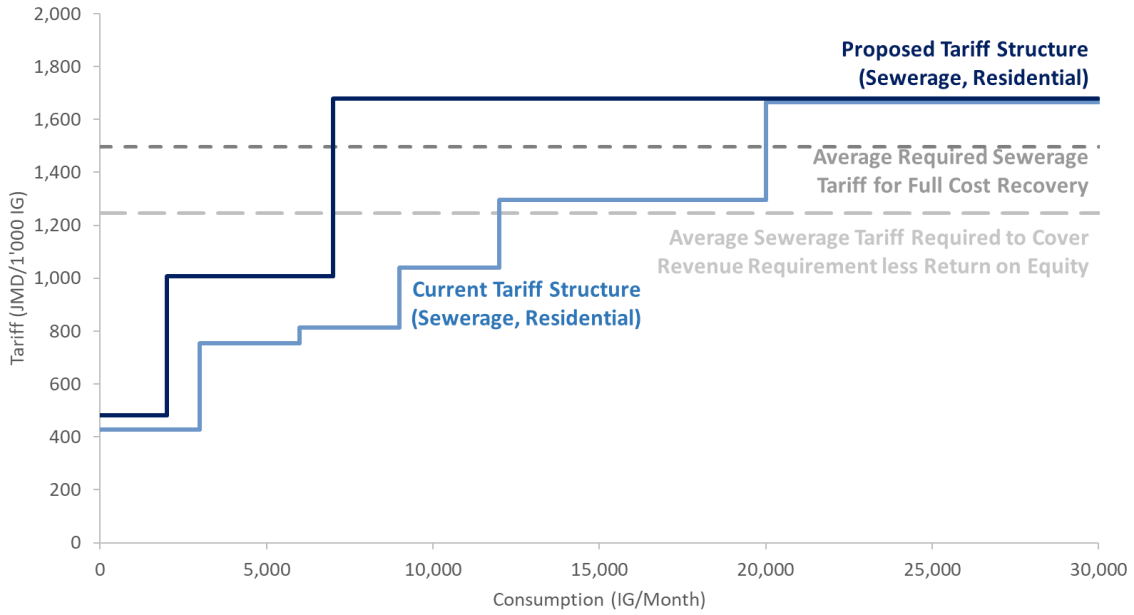
Even for a large household of 6 people, the lower bound of this block would correspond to consumption of 177lpcd, more than 3 times the basic needs level, so there should be no concerns of hardship from setting the tariffs at this level. Rather, this consumption block is likely to be used by wealthier households with pools or gardens. Setting the rate above the average cost of service will allow NWC to cross-subsidize low consumption users, who are generally poorer.

## 8.4.2 Residential tariffs for sewerage services

NWC proposes to set residential sewerage tariffs by applying the same framework as for water tariffs—with a lifeline block set below average cost, an average consumption block set near average cost, and an excess consumption block set above average cost.

Figure 8.2 compares the proposed residential tariff structure for sewerage services (shown by the dark blue line) to the existing residential tariff structure for sewerage services (shown by the light blue line). The average required sewerage tariff for full cost recovery (JMD1,498/1,000IG) is shown by a dark gray dotted line. Below it, the average required sewerage tariff to cover the revenue requirement without a return on equity (JMD1,246/1,000IG) is shown by a light gray dotted line.

**Figure 8.2: Comparison of Existing and Proposed Residential Tariffs for Sewerage Services**




NWC proposes that the sewerage rate for the lifeline block be set at JMD483/1,000IG, which is just 13 percent higher than the current rate. This is a low increase compared to the average required increase of 51 percent across all sewerage tariffs.

NWC proposes that the sewerage rate for the average volume block be set at JMD1,007/1,000IG, which is 19 percent below NWC's average sewerage cost of service (excluding return on equity).

NWC proposes that the sewerage rate for the excess volume block be set at JMD1,678/1,000IG, which is 35 percent above NWC's average sewerage cost of service (excluding return on equity).

*Affordability of the lifeline block for poor households*

Table 8.7 presents the affordability of water and sewerage bills for typical households at the bottom income quintile in Jamaica, each consuming a basic needs volume of water and sewage. The entire consumption of each household would fall within the lifeline block, as that applies to consumption up to 2,000IG.

As shown in the fifth column, each household would face a 27 to 32 percent increase in their bills. As shown in the rightmost column, the total bill under proposed tariffs would be from 7.4 percent to 8.9 percent of expenditure, compared to 5.8 percent to 6.7 percent of expenditure today.

**Table 8.7: Affordability of Bills for Basic Needs Consumption for Poor Households**

| Household Size | Consumption (IG) | Bill under Existing Tariffs (JMD) | Bill under Proposed Tariffs (JMD) | % Increase | Bill as % of Expenditure under Existing Tariffs | Bill as % of Expenditure under Proposed Tariffs |
|---|---|---|---|---|---|---|
| 4 | 1,320 | 2,256 | 2,971 | 32% | 6.7% | 8.9% |
| 5 | 1,650 | 2,588 | 3,345 | 29% | 6.2% | 8.0% |
| 6 | 1,980 | 2,920 | 3,719 | 27% | 5.8% | 7.4% |

Source: See sources in Table 8.4.

The Planning Institute of Jamaica and The Statistical Institute of Jamaica. "Jamaica Survey of Living Conditions, 2015." (Standard Tables, Table A-4, page 3). April 2017.

The inputs used to calculate the bills and the percentage of expenditure spent on water and sewerage services are described below. Table 8.8 shows a breakdown of the calculation of the water bills—which include water tariffs, sewerage tariffs, service charges, PAM, X-Factor, and K-Factor—for a household of five people.

**Table 8.8: Breakdown of Change in Bill for Poor Households of 5 People**

| Bill Component | Rates under Existing Tariffs (JMD/ 1,000IG) | Bill under Existing Tariffs (JMD) | Rates under Proposed Tariffs (JMD/ 1,000IG) | Bill under Proposed Tariffs (JMD) | % Increase in Bill |
|---|---|---|---|---|---|
| Water Tariff | 471 | 778 | 495 | 817 | 5% |
| Sewerage Tariff | 428 | 706 | 483 | 797 | 13% |
| Water Service Charge | 830 | 830 | 870 | 870 | 5% |
| Sewerage Service Charge | 0 | 0 | 400 | 400 | N/A |
| PAM* | 2.73% | 66 | N/A | - | N/A |
| X-Factor | (6%) | (149) | 0% | - | N/A |
| K-Factor | 16% | 357 | 16% | 461 | 29% |
| **Total** | **N/A** | **2,588** | **N/A** | **3,345** | **29%** |

*From base tariffs, set in January 2018, until April 2018.

Source: Statistical Institute of Jamaica. "Consumer Price Index". (http://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx, accessed 13 September 2018)

NWC Electricity Bills.

Bank of Jamaica. "Historical Exchange Rates." (http://www.boj.org.jm/foreign_exchange/fx_historical_rates.php, accessed 13 September 2018).

*Affordability of the proposed tariff structure for average households*

Table 8.9 presents the affordability of bills for water and sewerage services for typical households at the medium income quintile in Jamaica, each consuming an average volume of water and sewerage services. As shown in the fifth column, each household would face a 45 to 52 percent increase in their bills.

**Table 8.9: Affordability of Consumption for Average Households**

| Household Size | Consumption (IG) | Bill under Existing Tariffs (JMD) | Bill under Proposed Tariffs (JMD) | % Increase | Bill as % of Expenditure under Existing Tariffs | Bill as % of Expenditure under Proposed Tariffs |
|---|---|---|---|---|---|---|
| 4 | 3,300 | 4,478 | 6,816 | 52% | 5.5% | 8.4% |
| 5 | 4,124 | 5,942 | 8,767 | 48% | 5.9% | 8.6% |
| 6 | 4,950 | 7,405 | 10,718 | 45% | 6.1% | 8.8% |

Source: See sources in Table 8.4.

The Planning Institute of Jamaica and The Statistical Institute of Jamaica. "Jamaica Survey of Living Conditions, 2015." (Standard Tables, Table A-4, page 3). April 2017.

## 8.5 Commercial Tariffs and Standby Charge

NWC's proposed commercial tariff structure is intended to encourage major users to stay on NWC's system, or to pay for standby capacity if they leave the system. Currently, some major commercial users—for instance, some hotels on the North Coast—rely primarily on alternative sources of water supply but maintain connections to NWC's system as a back-up. NWC is required to reserve capacity for these users in case any of these alternative sources of supply fail, yet these users do not pay NWC for the "stand-by" service.

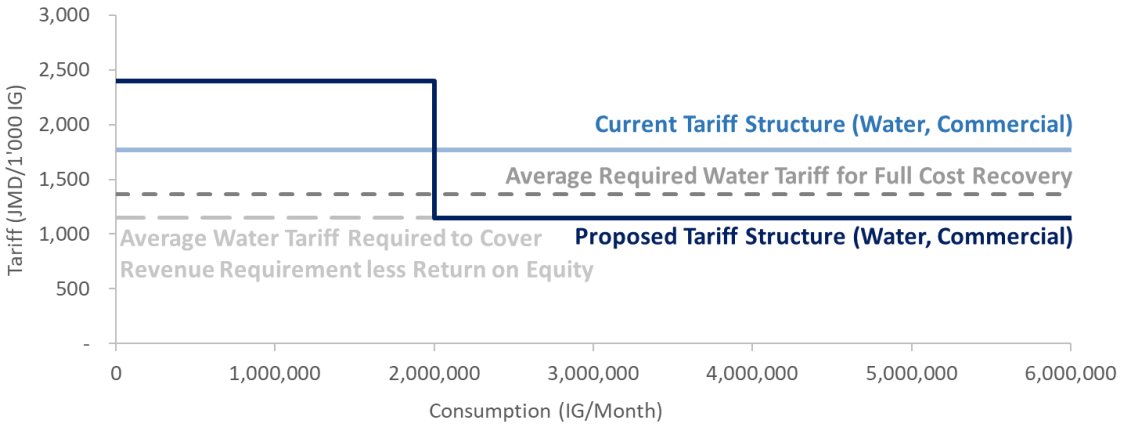
NWC proposes the following:

- A decreasing block tariff structure, which means customers are charged at a lower volumetric rate once consumption passes a certain threshold—so as to keep large users on the system
- A standby charge, which means customers are charged for the availability of NWC's capacity, even when they do not use the capacity.

### 8.5.1 Commercial tariffs for water services

Figure 8.3 compares the proposed decreasing block tariff for water services (shown by the dark blue line) with the existing tariff for water services (shown by the light blue line). The average required water tariff for full cost recovery (JMD1,362/1,000IG) is shown by a dark gray dotted line. Below it, the average required water tariff to cover the revenue requirement without a return on equity (JMD1,147/1,000IG) is shown by a light gray dotted line.

**Figure 8.3: Proposed Commercial Tariffs for Water Services**




NWC knows that Moon Palace, a hotel that previously consumed about 4,000,000 IG/month from NWC, switched to its own water supply source. This indicates that 4,000,000 IG/month is likely above the volume where self-supply becomes less expensive than supply from NWC. As such, NWC proposes that the upper bound for consumption in the first commercial block be 2,000,000 IG/month—above this threshold, equivalent to 0.3MLD, self-supply becomes likely, in NWC's judgement.

NWC proposes that the rate for the first block be set at JMD2,396/1,000 IG, which is 36 percent higher than the prevailing rate. Given an average required increase in water revenue of 23 percent, and the desire to keep the increase in the lifeline residential block low at 5 percent, it is necessary for commercial customers to bear a greater proportion of the burden of the tariff increase.

NWC proposes that the rate for the second block be set at average cost (JMD1,147/1,000 IG), which is 35 percent lower than the prevailing commercial rate, to encourage major users that have not already left to stay on NWC's system. The tariffs are compared to current tariffs in Table 8.10.

**Table 8.10: Comparison of Current and Proposed Commercial Water Tariffs**

| Consumption Blocks | Current Tariff (JMD/1,000IG) | Proposed Tariff (JMD/1,000IG) | % Change |
|---|---|---|---|
| 0IG-2,000,000IG | 1,768 | 2,396 | 36% |
| Over 2,000,000IG | 1,768 | 1,147 | -35% |

Table 8.11 compares water bills for commercial customers with various consumption levels. In the proposed structure, the water bill increases by 45 percent at lower consumption levels. However, at higher consumption volumes, the bill would decrease, due to the declining block structure.

**Table 8.11: Comparison of Water Bill under Current and Proposed Tariffs for Various Commercial Customer Consumption Profiles**

| Consumption (IG) | Water Bill Under Current Tariffs (JMD) | Water Bill Under Proposed Tariffs (JMD) | Percentage Increase (%) |
|---|---|---|---|
| 1,000,000 | 1,924,130 | 2,780,682 | 45% |
| 2,000,000 | 3,846,830 | 5,559,624 | 45% |
| 3,000,000 | 5,769,530 | 6,889,789 | 19% |
| 4,000,000 | 7,692,230 | 8,219,955 | 7% |
| 5,000,000 | 9,614,930 | 9,550,120 | -1% |
| 6,000,000 | 11,537,630 | 10,880,285 | -6% |

### 8.5.2 Standby charge

Under a standby charge, major commercial users who only retain their NWC connections to use the NWC network as a backup water supply would pay for the availability of NWC's capacity even when they do not use the capacity. This is cost-reflective because it allows NWC to recover the capital and fixed operating costs of its unused capacity.

The proposed standby charge, JMD781/1,000IG, is equal to the average incremental capacity cost of NWC's next two planned water schemes—Rio Cobre to serve the Kingston and St. Andrew area, and Rio Bueno to serve the North Coast.

The average incremental capacity cost is derived by dividing the annual capacity cost by the volume of water expected to be sold in one year. The annual capacity cost of each scheme is estimated by summing the annualized capital cost and fixed operating costs per year.[67] Table 8.12 shows the inputs used to derive the average incremental capacity cost of Rio Cobre and Rio Bueno.

**Table 8.12: Incremental Capacity Cost of Rio Cobre and Rio Bueno**

| Project | Annualized Capital Cost (JMD millions/ year) | Fixed Operating Costs (JMD millions/ year) | Annual Capacity Cost (JMD millions/ year) | Volume of Additional Water Sold in a Year (IG billions) | Incremental Capacity Cost (JMD/ 1,000IG) |
|---|---|---|---|---|---|
| Rio Bueno | 726 | 64 | 790 | 1.47 | 599 |
| Rio Cobre* | N/A | N/A | 1,414 | 1.47 | 964 |

* Rio Cobre will be operated under a public-private partnership arrangement where the private contractor pays the capital costs and operating costs up front. Costs to NWC will be governed by a water purchase agreement (WPA). As such, the annual capacity cost is based on the terms of the WPA.

[67] The annualized capacity cost is equal to an annuity payment calculated using the capital cost of the plant, the life of the plant, and NWC's weighted average cost of capital.

The volume of additional water supplied in a year is calculated assuming NRW remains at 73 percent of production volume.[68] This is reasonable because the standby charge imposed today should reflect NWC's costs under current operating conditions.

As NWC improves NRW, the standby charge could be reduced, to reflect that more water can be sold from a unit of capacity. Table 8.13 presents a sensitivity analysis of the average incremental capacity cost of the two schemes.

**Table 8.13: Sensitivity Analysis of the Incremental Capacity Cost of Rio Cobre and Rio Bueno**

| NRW Level (%) | Volume of Additional Water Supplied in a Year (IG billions) | Average Incremental Capacity Cost (JMD/ 1,000IG) |
|---|---|---|
| 55% | 2.46 | 465 |
| 40% | 3.29 | 347 |
| 25% | 4.11 | 279 |

### Operating rules for the standby charge regime

A standby charge will allow NWC to recover the cost of reserving capacity for major commercial users that usually self-supply but wish to maintain a backup connection to NWC's network. However, without proper rules in place, such users would have incentives to pay for less standby capacity then they truly need, or to not pay for standby capacity at all.

To ensure proper functioning of the regime, NWC will implement the following rules:

- Each commercial user will be identified as a 'standby user' or a 'non-standby user'. This will be done through self-identification, and through identification by NWC
- Usage of non-standby users (meaning those that are not identified as standby users, and do not pre-agree a standby volume) will be monitored. Suspicious consumption patterns—such as alternating between zero or very low consumption some months, and very high consumption in others—will be analyzed to check if the user should transition to a standby rate
- Standby users will be required to set their desired standby volume on a forward-looking basis for the next 12 months. Standby volumes must be agreed in advance to oblige the standby user to pay for the standby service
- A penalty of two times the normal volumetric rate will apply if standby users exceed the pre-agreed standby volume.

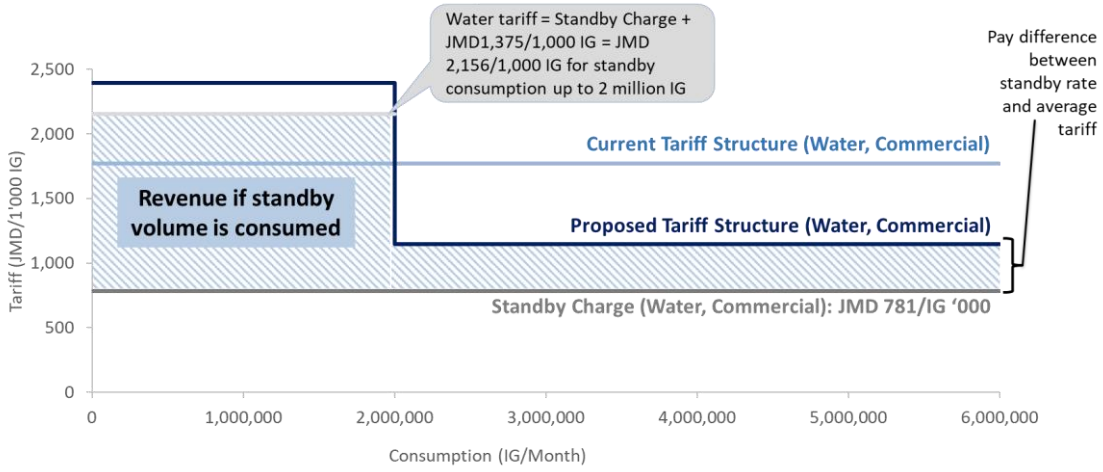
If a standby user consumes all or part of its standby volume, it will be charged at a volumetric rate of JMD1,375/1,000IG (up to 2,000,000IG/month) and JMD366/1,000IG (above 2,000,000 IG/month) as shown in Figure 8.4.

In the first consumption block, the standby rate and the volumetric rate sum to 90 percent of the proposed first block commercial rate. Standby users are charged a lower cumulative rate because they must specify a maximum consumption volume. In the second consumption

[68] Capacity = 1,500,000 IG/day. There are 365 days in a year. 1,500,000*365=1.47 billion IG/year.

block, the standby rate and the volumetric rate sums to 100 percent of the proposed second block commercial rate.

**Figure 8.4: Water Standby Charge for Commercial Users**




### 8.5.3 Commercial tariffs for sewerage services

NWC proposes that the tariff for sewerage services be set at 98 percent of water tariffs. This means setting the rate for the first block at JMD2,337/1,000IG and the rate for the second block at JMD1,119/1,000IG. The tariffs are compared to current tariffs in Table 8.10.

**Table 8.14: Comparison of Current and Proposed Commercial Sewerage Tariffs**

| Consumption Blocks | Current Tariff (JMD/1,000IG) | Proposed Tariff (JMD/1,000IG) | % Change |
|---|---|---|---|
| 0IG-2,000,000IG | 1,605 | 2,337 | 46% |
| Over 2,000,000IG | 1,605 | 1,119 | -30% |

Figure 8.3 compares the proposed decreasing block tariff for sewerage services (shown by the dark blue line) with the existing tariff for sewerage services (shown by the light blue line). The average required sewerage tariff for full cost recovery (JMD1,498/1,000IG) is shown by a dark gray dotted line. Below it, the average required sewerage tariff to cover the revenue requirement without a return on equity (JMD1,246/1,000IG) is shown by a light gray dotted line.

**Figure 8.5: Proposed Commercial Tariffs for Sewerage Services**

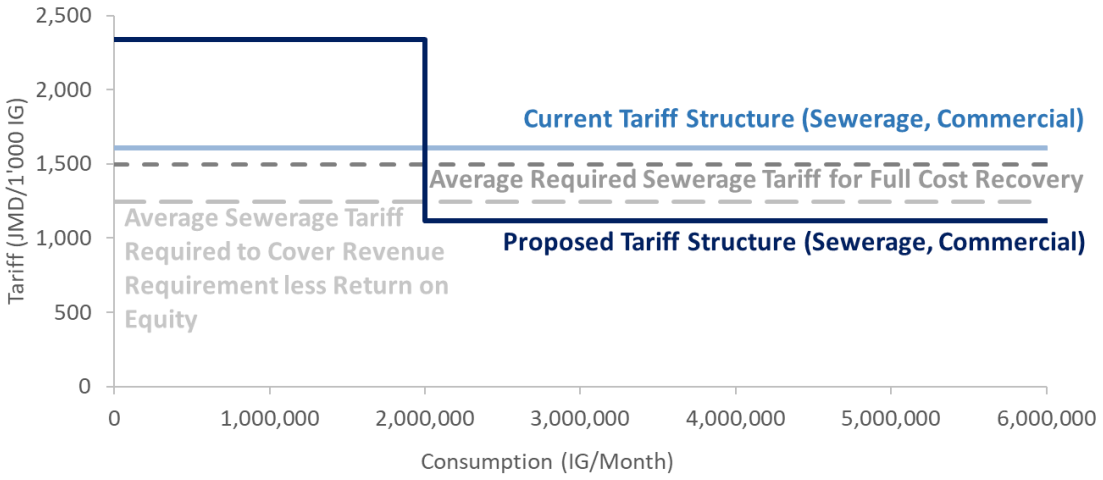



Table 8.15 compares combined water and sewerage bills for commercial customers with various consumption levels. In the proposed structure, the bill increases by 50 percent at lower consumption levels. However, at higher consumption volumes, the bill would decrease, due to the declining block structure.

**Table 8.15: Comparison of Combined Water and Sewerage Bill under Current and Proposed Tariffs for Various Commercial Customer Consumption Profiles**

| Consumption (IG) | Bill Under Current Tariffs (JMD '000s) | Bill Under Proposed Tariffs (JMD '000s) | Percentage Increase (%) |
|---|---|---|---|
| 1,000,000 | 3,669,113 | 5,491,875 | 50% |
| 2,000,000 | 7,336,795 | 10,982,011 | 50% |
| 3,000,000 | 11,004,477 | 13,610,092 | 24% |
| 4,000,000 | 14,672,159 | 16,238,173 | 11% |
| 6,000,000 | 18,339,842 | 18,866,254 | 3% |
| 8,000,000 | 22,007,524 | 21,494,335 | -2% |

## 8.6 Condominium Tariffs

NWC charges condominiums at a constant volumetric rate. The volumetric rate does not change based on consumption, because consumption is measured for entire condominium buildings.

As shown in Table 8.16, NWC proposes increasing the water tariff by 36 percent, from JMD877/1,000IG to JMD1,188/1,000IG; and setting the sewerage tariff for condominium customers at 98 percent of water tariffs, increasing from JMD796/1,000IG to JMD1,159/1,000IG. The percentage changes applied are the same as those applied to commercial customers.

**Table 8.16: Comparison of Current to Proposed Condominium Tariffs**

| Water/Sewerage | Current Tariff (JMD/1,000IG) | Proposed Tariff (JMD/1,000IG) | % Change |
|---|---|---|---|
| Water | 877 | 1,188 | 36% |
| Sewerage | 796 | 1,159 | 46% |

## 8.7 School Tariffs

As shown in Table 8.17, NWC proposes increasing the water tariff for schools by 36 percent, from JMD707/1,000IG to JMD958/1,000IG; and setting the sewerage tariff for schools at 98 percent of water tariffs, increasing from JMD642/1,000IG to JMD935/1,000IG. The percentage change applied are the same as those applied to commercial customers and condominium customers

The proposed tariffs for schools remain below the average cost under the proposal (JMD1,147/1,000IG for water and JMD1,349/1,000IG for sewerage). This ensures that schools customers are cross-subsidized by commercial customers and high consumption residential customers, who pay higher than average cost.

**Table 8.17: Comparison of Current to Proposed School Tariffs**

| Water/Sewerage | Current Tariff (JMD/1,000IG) | Proposed Tariff (JMD/1,000IG) | % Change |
|---|---|---|---|
| Water | 707 | 958 | 36% |
| Sewerage | 642 | 935 | 46% |

## 8.8 Service Charges

Service charges are fixed monthly charges for all NWC's water customers. The charge is meant to cover the fixed cost of providing customers with a connection to NWC's water network.

Almost all customers (98.8 percent) have the smallest connection size of 5/8 inch/15mm. Among residential customers, 99.6 percent have a connection size of 5/8 inch/15mm. Table 8.18 compares the percentage of customers with a connection size of 5/8 inch/15mm to those with other connection sizes, by customer category.

**Table 8.18: Comparison of Percentage of Customers' Connection Sizes by Customer Category**

| Customer Category | % Customers with Connection Size of 5/8 inch/15mm | % Customers with Other Connection Sizes |
|---|---|---|
| Residential | 99.6% | 0.4% |
| Commercial | 89.9% | 10.1% |
| Condominium | 31.2% | 68.8% |
| School | 50.0% | 50.0% |
| **Total** | **98.8%** | **1.2%** |

NWC proposes that the water service charge for customers with a connection size of 5/8 inch/15mm be increased by just 5 percent, the same as the increase for baseline block water

tariffs. This low increase, relative to the 26 percent increase required overall, helps ensure water bills remain affordable to the poor. As described in Section 8.4.1, under the proposed structure, poor customers' bills do not increase by more than 10 percent (after factoring in the revised K-Factor and X-Factor).

NWC proposes that the water service charges for customers with all other connection sizes be increased by 26 percent, which is equal to the increase in revenue needed for NWC to meet the cost of service (excluding return on equity).

Table 8.19 compares NWC's current water service charges to the proposed service charges.

**Table 8.19: Comparison of Current Water Service Charges to Proposed Water Service Charges**

| Service Charge Category Based on Connection Size | Current Charges (JMD/Month) | Proposed Charges (JMD/Month) | % Increase |
|---|---|---|---|
| 5/8 inch/15mm | 830 | 870 | 5% |
| 3/4 inch/20mm | 1,700 | 2,140 | 26% |
| 1 inch/25mm | 2,220 | 2,800 | 26% |
| 1 1/4 inch/30mm | 4,180 | 5,270 | 26% |
| 1 1/2 inch/40mm | 4,180 | 5,270 | 26% |
| 2 inch/50mm | 5,920 | 7,460 | 26% |
| 3 inch/75mm | 10,750 | 13,550 | 26% |
| 4 inch/100mm | 17,370 | 21,890 | 26% |
| 6 inch/150mm | 26,460 | 33,340 | 26% |

NWC also proposes introducing sewerage service charges. As with water services, there should be a charge that covers the fixed cost of providing customers with a connection to NWC's sewerage network. NWC proposes setting service charges at JMD400/month for non-commercial customers and at JMD5,000/month for commercial customers.

## 8.9 Price Adjustment Mechanism

The purpose of PAM is to adjust the tariffs for changes in input costs which are beyond NWC's control. The PAM aims to ensure that NWC can cover its costs in the future even if input prices increase, while not allowing NWC to increase its tariffs to cover things that are under management control (such as employing more people or being less efficient in the use of energy).

PAM is essential to ensure that NWC earns enough revenue to cover its increasing cost of service. For the PAM to meet its purpose, the mechanism should have the following characteristics:

- The indexes used reflect of the cost drivers of NWC
- The weight given to each index is equal to the proportion of NWC's cost of service that varies when the index varies. For instance, the weight given to the electricity price index should be equal to the proportion of NWC's cost of service that varies when the electricity price varies—namely, electricity costs.

Currently, the PAM tracks for movements in three indices—the CPI, the Jamaica dollar/US dollar exchange rate, and the electricity price. As explained in Section 7, PAM did not account for the full increase in NWC's cost of service during the tariff period. NWC's cost of service increased by 45 percent from JMD26.2 billion to JMD37.9 billion, whereas tariffs were adjusted for PAM by just 21 percent. This means that the additional revenue NWC earned due to PAM adjustments was less than half what it required to cover the increase in its cost of service.

Key reasons for the discrepancy were a major asset revaluation done in 2013 (the first since 2002), an increase in operating costs due to new projects (such as the Portmore Sewerage Project and NRW Co-Management Programme), actuarial adjustments to pension costs, and other one-off additions. No index tracks such one-off additions.

NWC agrees that the three indices generally have worked well to track input cost increases for NWC's inputs, and should be maintained. However, as shown in Table 8.20 and Table 8.21, weights should be revised to reflect the changes in the proportions of various costs in NWC's cost of service. Further, as described in Section 8.11, resetting tariffs in 3 years instead of 5 years will help identify and correct for the one-off additions appropriately.

Table 8.20 shows the adjusted PAM index weights based on the test year costs.

**Table 8.20: PAM Index Weights Based on Test Year Costs**

| Cost of Service Component | Test Year Cost (JMD '000) | Weight (%) | Recommended Index |
|---|---|---|---|
| Operating expenses excluding electricity | 19,939,568 | 58% | CPI |
| Electricity | 6,924,413 | 20% | Electricity Prices |
| Depreciation | 5,229,049 | 15% | Foreign Exchange Index |
| Loan Interest | 2,356,187 | 7% | Foreign Exchange Index |
| **Total** | **34,469,523** | **100%** | N/A |

Source: See Table 8.1.

OUR. "National Water Commission Review of Rates: Determination Notice", 92. 1 October 2013.

Because both depreciation and loan interest are proposed to be indexed to the foreign exchange rate, the individual weights shown in Table 8.20 (15 percent and 7 percent, respectively) are summed to obtain a total weight of 22 percent. As shown in Table 8.21, NWC proposes that the PAM be indexed to 58 percent CPI, 20 percent electricity prices, and 22 percent foreign exchange index.

**Table 8.21: Comparison of Current and Proposed PAM Weights**

| Index | Proposed Weight | Current Weight |
|---|---|---|
| CPI | 58% | 51% |
| Electricity Prices | 20% | 25% |
| Foreign Exchange Index | 22% | 24% |
| **Total** | **100%** | **100%** |

Source: See Table 8.20.

OUR. "National Water Commission Review of Rates: Determination Notice", 92. 1 October 2013.

## 8.10 Purchased Water Services Charge

NWC also needs to be able to pass on charges which result from OUR-approved prices set by entities which provide bulk water, wastewater collection and treatment, or NRW reduction services to NWC. This is similar to the purchased power pass-through that the OUR allows JPS.[69] A purchased water service pass-through charge is reasonable because, when approving these costs, the OUR is already checking for the efficiency of the costs. NWC proposes that the OUR approve adding a 'purchased water service charge' to be included in customers' bills.

Eligible purchased water service charges will be those charges, whether variable or fixed, that meet the following criteria:

- The charge is for a supply of a water or wastewater service, where:
  - Water services include the supply of bulk water; distribution of water; and reduction in water losses
  - Wastewater services include collection of waste-water, treatment of waste-water, disposal of effluent, and treatment and disposal of sludge.
- The charge is incurred pursuant to a contract with a third-party provider, where:
  - The use of such a third-party provider was included in an improvement plan proposed by NWC and approved by the OUR
  - The third-party provider was procured in accordance with a process approved by the OUR.

All eligible purchased water services charges incurred each month will be added and recovered through billings in the following month. All charges related to water services will be added, divided by the volume of water sold, and the resulting figure in JMD/1,000IG will be multiplied by each customer's billed water consumption and added to the customer's bill. Charges related to wastewater services will be divided by the total volume of wastewater billed, and the resulting unit charge multiplied by the wastewater billed to each customer and added to the customer's bill.

## 8.11 K-Factor and X-Factor

NWC requests that the K-Factor, which will be used to finance OUR-approved K-Factor projects, be maintained at 16 percent (see Table 8.22).[70] NWC requests that the X-Factor be set at 0 percent, as NWC would not earn a return on equity under the proposed tariff structure. The net impact of the K-Factor and X-Factor on base tariffs would be 16 percent.

[69] OUR. "Jamaica Public Service Company Limited Tariff Review for Period 2014-2019 OUR Determination Notice", xxxiv. 7 January 2015.

[70] NWC. "Tariff" (https://www.nwcjamaica.com/Rates, accessed 17 September 2018).

**Table 8.22: Proposed K-Factor and X-Factor**

| | FY2019 | FY2020 | FY2021 | FY2022 |
|---|---|---|---|---|
| X-Factor | 0% | 0% | 0% | 0% |
| K-Factor | 16% | 16% | 16% | 16% |

K-Factor funding to date has allowed NWC to make efficiency-enhancing gains. The efficiency gains from these projects are already embodied in NWC's cost of service now. In other words, the actual cost of service would be higher than JMD37.9 billion had NWC not already achieved the efficiency gains.

Given this, the X-Factor cannot be carried forward at its current level of -6.25 percent. Rather, the X-Factor must be set at a level that matches the gains NWC is expected to be able to achieve in the tariff period.

The projects that can achieve significant efficiency gains are NRW reduction projects, that NWC has decided to implement across its entire network. However, given external constraints of approvals for funding and procurement, NRW reduction performance-based contracts are not likely to start until 2 years from now.

In practice, the NRW reduction contract for Kingston took 3 years from decision to implementation.[71] In the Northern Parishes, a pre-feasibility study confirming the desirability of an NRW-PBC was completed in April 2017.[72] The request for proposal to hire a consultant to prepare the feasibility study and provide transaction advisory services for the project was issued over a year later in September 2018, with services expected to begin in April 2019. Considering the remaining steps to be completed, it is unlikely that a contractor could start work before March 2020—3 years after the urgent need for the project was identified.

Thus, rather than impose an X-Factor that will starve NWC of the revenue it needs to cover the bare minimum of its cost of service, it is better to reset the tariffs again after 3 years, when the size of the efficiency gains will be known and measurable.

NWC will account for the deemed K-factor cash inflow calculated on the basis of 90 percent of the K-factor billing. This is the same as NWC's collection rate target for FY2019-FY2020. This means that NWC would be required to deposit into the K-Factor bank account 90 percent of billed K-Factor revenue. NWC is incentivized to maintain a collection ratio at or above 90 percent; otherwise, non-K-Factor revenue intended to cover NWC's cost of service would need to be diverted into the K-Factor bank account.

NWC will report monthly to the OUR on balances and changes on the account, within 45 days of each reporting period. K-Factor billed shall be deemed collected within 45 days after billing.

## 8.12 Charge for Reduced Sewage Volume

NWC desires to more accurately charge commercial users which use water as an input to their operations. These customers do not return all water consumption as wastewater to the NWC

[71] Inter-American Development Bank. "Kingston Metropolitan Area (KMA) Water Supply Improvement Program (2633/OC-JA) Procurement Plan". 19 January 2012.

[72] Castalia. "Northern Parishes Water Supply Project: Pre-Feasibility Study to Assess Viability of PPP Transaction" April 2017.

sewer network. NWC's current approach is to charge these customers a reduced *rate*—called the economic development wastewater tariff (EDWT)—for wastewater services.

NWC proposes to eliminate the EDWT and instead charge these customers for a reduced *volume* of wastewater, at the usual rate for sewerage services. NWC will allow adjustments to wastewater consumption for customers that can prove how much wastewater they discharge, for example through:

- Measurements from a sewerage discharge meter (permanent installation)
- Sewerage flow monitoring device (temporary installation)
- Internal process meter (measures the volume of water that does not return to the sewerage system).

This approach is similar to those adopted by other utilities, including Southern Water in the United Kingdom and the City of Gold Coast in Australia.[73][74]

## 8.13 Charges for Inactive and Delinquent Accounts

NWC has determined that there are a number of customers who have been disconnected from water supply for non-payment of bills but are still benefiting from sewerage services provided by the NWC. In many cases, these customers remain "inactive" for prolonged periods and receive no further penalties for their actions to the extent that the usage of water resumes without the detection of the company. NWC suggests charging these customers an estimated sewerage service bill.

In addition, NWC proposes to charge a late payment interest charge for commercial accounts that remain unpaid 7 days after the due date. The planned interest charge is similar to that recently applied by JPS.

Last, NWC plans to continue to charge residential customers a late payment fee of JMD250 and offer an early payment incentive fee of JMD250.

NWC requests that, in its determination, the OUR confirm that it has no objections to the assessment of charges to delinquent and inactive customers.

[73] Southern Water. "Return to Sewer Non-Household Policy", 4. 1 September 2016. (https://www.southernwater.co.uk/media/default/PDFs/retailer-non-return-sewer.pdf, accessed 17 September 2018).

[74] City of Gold Coast. "Sewage discharge factor variation standards: Applying for a variable discharge factor". (http://www.goldcoast.qld.gov.au/documents/bf/Sewage_discharge_factor_variation_standards(1).pdf, accessed 17 September 2018).

# 9 How the Proposed Tariffs Meet NWC's Revenue Requirement

The tariffs proposed in Section 8 have been set so that NWC exactly achieves its revenue requirement (excluding the return on equity) of JMD33.9 billion. This also holds true for each of water and sewerage services on their own. Projected revenue from water services is equal to NWC's cost of providing water services (JMD26.1 billion), and projected revenue from sewerage services is equal to NWC's cost of providing sewerage services (JMD7.8 billion).

To check that projected revenue is equal to required revenue, NWC carried out the following steps, separately for water and sewerage services:

- Multiply the volumetric tariff for each customer category and block by estimated consumption for the corresponding customer category and block, to obtain projected revenue from volumetric tariffs by customer category and block
- Sum projected revenue for each customer category and block to obtain total projected revenue from volumetric tariffs
- Multiply the service charge for each connection size by the number of customers that have that connection size or are in that customer category to obtain projected revenue from service charges by connection type or customer category
- Sum projected revenue by connection size to obtain total projected revenue from service charges.

## 9.1 Water Services

Table 9.1 shows the breakdown of projected water consumption under the proposed tariffs by customer category and consumption block, and the inputs used to derive projected water consumption.

For instance, the first row of the table shows that the tariff for the first residential block has increased by 5 percent, from JMD471/1,000 IG to JMD495/1,000 IG. Given price elasticity of demand, consumption in this block is expected to fall by 0.8 percent, from 6.43 billion IG to 6.38 billion IG.

**Table 9.1: Change in Water Consumption due to Change in Tariffs**

| Proposed Consumption Block (IG) | Current Average Cumulative Water Tariff (JMD/ 1,000 IG) | Proposed Average Cumulative Water Tariff (JMD/ 1,000 IG) | Change in Average Cumulative Water Tariff (%) | Current Consumption in Block (IG, billions) | Expected Change in Consumption in Block (%) | Projected Consumption in Block (IG, billions) |
|---|---|---|---|---|---|---|
| Residential Tariffs | | | | | | |
| 0 – 2,000 | 471 | 495 | 5% | 6.43 | -0.8% | 6.38 |
| 2,000 – 7,000 | 591 | 793 | 34% | 4.99 | -5.4% | 4.72 |
| 7,000+ | 719 | 925 | 29% | 2.27 | -5.5% | 2.15 |
| Commercial Tariffs | | | | | | |
| 0 – 2,000,000 | 1,768 | 2,917 | 36% | 3.88 | -7.0% | 3.61 |

| Proposed Consumption Block (IG) | Current Average Cumulative Water Tariff (JMD/ 1,000 IG) | Proposed Average Cumulative Water Tariff (JMD/ 1,000 IG) | Change in Average Cumulative Water Tariff (%) | Current Consumption in Block (IG, billions) | Expected Change in Consumption in Block (%) | Projected Consumption in Block (IG, billions) |
|---|---|---|---|---|---|---|
| 2,000,000+ | 1,768 | 2,224 | 26% | 0.60 | -5.2% | 0.57 |
| Condominium Tariffs | | | | | | |
| All | 877 | 1,188 | 36% | 0.26 | -6.7% | 0.24 |
| School Tariffs | | | | | | |
| All | 707 | 958 | 36% | 0.67 | -6.9% | 0.63 |
| **Total** | | | | **19.16** | **-4.4%** | **18.30** |

Note: The average cumulative water tariff is equal to the weighted average tariff for the selected consumption block, plus lower consumption blocks in the same tariff category. For example, the cumulative water tariff for the second residential block (2,000 IG – 7,000 IG) is the weighted average tariff for all consumption from 0 IG to 7,000 IG. This is done because customers consuming in upper blocks will make decisions about consumption reduction based on the cumulative increase in tariffs.

Table 9.2 shows the projected revenue by customer category and block, which is obtained by multiplying consumption in each block by the tariff for that block. Revenue from each block is summed to obtain total revenue from volumetric water charges.

**Table 9.2: Projected Revenue from Volumetric Water Charges by Customer Category and Consumption Block**

| Proposed Consumption Block (IG) | Proposed Water Tariff (JMD/ 1,000 IG) | Projected Consumption in Block (IG, billions) | Revenue (JMD Billions) |
|---|---|---|---|
| Residential Tariffs | | | |
| 0 – 2,000 | 495 | 6.4 | 3.2 |
| 2,000 – 7,000 | 1,032 | 4.7 | 4.9 |
| 7,000+ | 1,720 | 2.1 | 3.7 |
| Commercial Tariffs | | | |
| 0 – 2,000,000 | 2,917 | 3.6 | 8.6 |
| 2,000,000+ | 1,147 | 0.6 | 0.7 |
| Condominium Tariffs | | | |
| All | 1,188 | 0.2 | 0.3 |
| School Tariffs | | | |
| All | 958 | 0.6 | 0.7 |
| **Total** | **N/A** | **18.3** | **21.9** |

Table 9.3 shows the projected revenue in JMD '000s from water service charges, which is obtained by multiplying the number of active water connections for each connection size by the service charge for that connection size. Revenue from connection size is summed to obtain total revenue from service charges.

**Table 9.3: Projected Revenue from Water Service Charges by Connection Sizes**

| Connection Size | Proposed Service Charges (JMD/Month) | Number of Active Water Connections | Revenue (JMD '000s) |
|---|---|---|---|
| 5/8 inch/15mm | 870 | 371,058 | 3,873,847 |
| 3/4 inch/20mm | 2,140 | 297 | 7,628 |
| 1 inch/25mm | 2,800 | 2,530 | 85,004 |
| 1 1/4 inch/30mm | 5,270 | 7 | 418 |
| 1 1/2 inch/40mm | 5,270 | 247 | 15,593 |
| 2 inch/50mm | 7,460 | 811 | 72,577 |
| 3 inch/75mm | 13,550 | 113 | 18,333 |
| 4 inch/100mm | 21,890 | 397 | 104,369 |
| 6 inch/150mm | 33,340 | 33 | 13,158 |
| **Total** | | **375,492** | **4,190,927** |

## 9.2 Sewerage Services

Table 9.4 shows the breakdown of projected sewage volume under the proposed water tariffs by customer category and consumption block, and the inputs used to derive projected sewage volume. Sewage volume in each customer category and block is expected to decrease at the same rate as water consumption.

For example, water consumption in the first residential block is expected to fall by 0.8 percent, so sewage volume in the first residential block is expected to fall by the same percentage, equal to 1.93 billion IG to 1.91 billion IG.

**Table 9.4: Change in Sewage Volume due to Change in Water Tariffs**

| Proposed Consumption Block (IG) | Expected Change in Water Consumption in Block (%) | Expected Change in Sewage Volume in Block (%) | Current Sewage Volume in Block (IG, billions) | Projected Sewage Volume in Block (IG, billions) |
|---|---|---|---|---|
| Residential | | | | |
| 0 – 2,000 | -0.8% | -0.8% | 1.93 | 1.91 |
| 2,000 – 7,000 | -5.4% | -5.4% | 1.21 | 1.15 |
| 7,000+ | -5.5% | -5.5% | 0.54 | 0.51 |
| Commercial | | | | |
| 0 – 2,000,000 | -7% | -7% | 1.58 | 1.47 |
| 2,000,000+ | -5% | -5% | 0.24 | 0.22 |
| Condominium | | | | |
| All | -7% | -7% | 0.15 | 0.14 |

| | | | | |
|---|---|---|---|---|
| Schools | | | | |
| All | -7% | -7% | 0.16 | 0.15 |
| **Total** | **-4%** | **-4%** | **5.82** | **5.54** |

Source: Table 9.1.

Table 9.5 shows the projected revenue from volumetric sewerage charges by customer category and block. This is obtained by multiplying sewage volume in each block by the sewerage tariff for that block. Revenue from each block is summed to obtain total revenue from volumetric sewerage charges.

**Table 9.5: Projected Revenue from Volumetric Sewerage Charges by Customer Category and Volume Block**

| Proposed Volume Block (IG) | Proposed Sewerage Tariff (JMD/ 1,000 IG) | Projected Volume in Block (IG, billions) | Revenue (JMD Billions) |
|---|---|---|---|
| Residential Tariffs | | | |
| 0 – 2,000 | 483 | 1.9 | 0.9 |
| 2,000 – 7,000 | 1,007 | 1.2 | 1.2 |
| 7,000+ | 1,678 | 0.5 | 0.9 |
| Commercial Tariffs | | | |
| 0 – 2,000,000 | 2,337 | 1.6 | 3.4 |
| 2,000,000+ | 1,119 | 0.2 | 0.3 |
| Condominium Tariffs | | | |
| All | 1,159 | 0.1 | 0.2 |
| School Tariffs | | | |
| All | 935 | 0.2 | 0.1 |
| **Total** | **N/A** | **5.5** | **6.9** |

Table 9.3 shows the projected revenue in JMD '000s from sewerage service charges, which is obtained by multiplying the number of active sewerage connections for each customer category by the service charge for that customer category. Revenue from each customer category is summed to obtain total revenue from service charges.

**Table 9.6: Projected Revenue from Sewerage Service Charges by Customer Category**

| Customer Category | Proposed Service Charges (JMD/Month) | Number of Sewerage Connections | Revenue (JMD '000s) |
|---|---|---|---|
| Commercial Customers | 5,000 | 6,756 | 405,342 |
| Non-Commercial Customers | 400 | 104,970 | 503,856 |
| **Total** | | **111,726** | **909,198** |

## 9.3 Summary

Table 9.7 summarizes how the proposed tariffs set out in Section 8 meet NWC's revenue requirement (excluding return on equity) of JMD33.9 billion. Table 9.7 shows, projected revenue from volumetric water charges is JMD21.9 billion, projected revenue from volumetric sewerage charges is JMD6.9 billion, projected revenue from water service charges is JMD4.2 billion, and projected revenue from sewerage services charges is JMD0.9 billion. Summing these four revenue streams gives a combined projected revenue of JMD33.9 billion, equivalent to NWC's revenue requirement (excluding return on equity).

**Table 9.7: Revenue from Proposed Tariffs Allow NWC to Meet its Revenue Requirement (Excluding Return on Equity)**

| Revenue Category | Revenue (JMD Billions) |
|---|---|
| Water volumetric charges | 21.9 |
| Water service charge | 4.2 |
| Sewerage volumetric charges | 6.9 |
| Sewerage service charge | 0.9 |
| **Total** | **33.9** |

Source: See Table 9.2, Table 9.5, and Table 8.1.

# 10 Proposed Guaranteed Standards and Performance Targets

The OUR sets service standards and targets for NWC, including Guaranteed Standards, financial performance targets, operational performance targets, and quality of service targets. For the current tariff period, these are set out in the OUR's Determination Notice of 2013,[75] Regulatory Framework of 2015,[76] and Mid-Tariff Determination Notice 2016.[77] 10 describes the standards and targets set by the OUR and summarizes NWC's performance against them.

This section presents the proposed standards and performance targets that NWC plans to achieve during the regulatory period from January 2019 to December 2021. NWC proposes to keep the existing Guaranteed Standards and streamline the performance targets. NWC also proposes to adjust some performance targets to reflect expectations of gradual improvement in performance. A glossary of key indicators is presented at the close of the section.

## 10.1 Guaranteed Standards

Guaranteed Standards are standards of service set by the OUR to ensure that customers receive acceptable service delivery. Customers are entitled to compensation each time NWC fails to meet a Guaranteed Standard. For some standards, customers are required to submit a claim to NWC to receive compensation. For other standards, a breach triggers automatic compensation.

NWC proposes to maintain the current Guaranteed Standards (shown below in Table 10.1) for the upcoming regulatory period. This will ensure continuity of NWC's commitments to its customers.

**Table 10.1: NWC's Guaranteed Standards**

| Code | Category | Standard | Description | Compensation Type |
|---|---|---|---|---|
| WGS1 | Access | Connection to Supply | Maximum of ten (10) working days to connect supply and install meter after establishment of contract | Claim |
| WGS2 | Delivery of Bills | Issue of First Bill | Maximum of forty (40) working days after connection of supply | Claim |
| WGS3 | Appointments | Issue of First Bill | Must make and keep an appointment at customer's request and must notify customer at least twenty-four (24) hours prior to the appointed time, if the appointment will not be kept | Claim |
| WGS4(a) | Complaints | Acknowledgement | Maximum of five (5) working days to acknowledge customer written complaints after receipt | Claim |

[75] Office of Utilities Regulation. "National Water Commission Review of Rates: Determination Notice". 1 October 2013.

[76] Office of Utilities Regulation. "Regulatory Framework for the National Water Commission (October 2013 – September 2018)". 1 April 2015.

[77] Office of Utilities Regulation. "National Water Commission Mid – Tariff Review 2016". 5 December 2016.

| Code | Category | Standard | Description | Compensation Type |
|---|---|---|---|---|
| WGS4(b) | Complaints | Investigations | Maximum of thirty (30) working days from the date of receipt of the complaint to complete investigation and respond or provide an update | Claim |
| WGS5 | Disconnection | Wrongful Disconnection | Where the NWC disconnects a supply that has no overdue amount or is currently under investigation by the OUR or the NWC and only the disputed amount is in arrears | Automatic |
| WGS6 | Account Status | Issue of Account Status | Meter to be read on same day customer is moving if on a weekday or within two (2) working days of move if on a weekend, provided five (5) working days' notice of move is given. Maximum time of fifteen (15) working days to provide final bill after moving and forty-five (45) days to refund the credit balances | Claim |
| WGS7 | Water Meters | Meter Installation | Maximum of thirty (30) working days to install meter on customer's written request | Claim |
| WGS8 | Water Meters | Repair of Replacement of Faulty Meters | Maximum of twenty (20) working days to verify, repair or replace meter after defect is identified or reported | Automatic |
| WGS9 | Water Meters | Changing Meters | NWC must provide customer with details of the date of the change, the reading on the old meter on the day and serial number of the new meter | Claim |
| WGS10(a) | Water Meters | Meter Reading | There should NOT be more than two (2) consecutive estimated bills (where NWC has access to meter) | Automatic |
| WGS10(b) | Water Meters | Exceptional Meter Reading | Where the NWC obtains a reading that falls within its exceptions criteria (60% high and 40% low), same is to be verified, the customer alerted upon verification and the reading applied to the customer's account within one (1) billing period | Claim |
| WGS11 | Reconnection | Reconnection after Payment of Overdue Amount | Maximum of twenty-four (24) hours to restore supply | Automatic |
| WGS12 | Reconnection | Reconnection after Wrongful Disconnection | NWC must reconnect a supply that was inadvertently disconnected within eight (8) hours of being notified of the error | Automatic |
| WGS13 | Compensation | Payment of Compensation | Maximum of thirty (30) working days to process and apply credit to customer's account | Automatic |

| Code | Category | Standard | Description | Compensation Type |
|---|---|---|---|---|
| WGS14 | Estimation of Consumption | Method of Estimation | An estimated bill should be based on the average of the last three (3) readings | Automatic |
| WGS15 | Billing Adjustment | Timeliness of Adjustment to Customer's Account | Where necessary, customer's account must be billed for an adjustment within three (3) months of (i) identification of error; or (ii) subsequent to replacement of faulty meter | Claim |

Source: Quarterly reports on Guaranteed Standards to the OUR.

## 10.2 Financial Performance Targets

Table 10.2 shows NWC's proposed financial performance targets for the new regulatory period. The first column shows the objective of each target and the second column shows the way the objective will be measured. The third column describes whether the targets are maximums, minimums, or exact targets. The remaining columns show the proposed target values.

**Table 10.2: Financial Performance Targets**

| Objective | Critical Measures | Type | Targets | | | |
|---|---|---|---|---|---|---|
| | | | FY2019 | FY2020 | FY2021 | FY2022 |
| Receivables | Days of Sales Outstanding for non-Government customers | Target (Max) | 60 | 55 | 50 | 45 |
| | Days of Sales Outstanding for Government customers | Target (Max) | 215 | 200 | 180 | 160 |
| Billing and Collection | Collection Rate | Target (Min) | 90% | 90% | 91% | 92% |
| Asset Valuation | Assets should reflect fair market valuation | Target | 100% | | | |
| X-factor | The X-factor is to be calculated as a deduction from the bill after the normal rates and PAM | Target | Keep | | | |
| K-factor | The K-factor should be calculated on the bill balance after the X-Factor. The NWC shall account for the deemed K-factor cash inflows on the basis of [X]% of the K-factor billing | Target | 90% | 90% | 91% | 92% |
| K-factor Monitoring | NRW Reporting† | Target | Yes | Yes | Yes | Yes |

| Objective | Critical Measures | Type | Targets | | | |
|---|---|---|---|---|---|---|
| | | | FY2019 | FY2020 | FY2021 | FY2022 |
| Profitability | Profit Margin | Target (Min) | 6% | 8% | 8% | 8% |
| Efficiency | EBITDA Margin | Target (Min) | 10% | 30% | 30% | 30% |
| Liquidity | Quick Ratio | Target (Min) | 0.6 | 0.75 | 0.9 | 1.1 |
| | Quick Ratio* | Target (Min) | 0.9 | 1.0 | 1.1 | 1.2 |
| Bankability | Debt Service Coverage Ratio | Target (Min) | 1.2 | 2.0 | 2.0 | 2.0 |
| Gearing | Debt Ratio | Target (Max) | 80% | 75% | 70% | 65% |

Note: † The NWC is required to submit quarterly reports to the OUR on the impact of the K-Factor program on overall NRW-reduction.

*Excluding the current portion of long-term debt from current liabilities.

**Targets to adjust**

NWC proposes to separate the receivables objective into two separate critical measures: days of sales outstanding for government customers and days of sales outstanding for non-government customers. Currently, days of sales outstanding for government customers is 215 days. NWC proposes to reduce this to 160 days by FY2022, with gradual interim improvements. For non-government customers, days of sales outstanding is 60 days. NWC aims to achieve a target of 45 days by FY2022, with interim targets of 55 days (FY2020) and 50 days (FY2021).

NWC aims to achieve its current collection rate target of 92 percent by FY2022, with interim targets of 90 percent (FY2019 and FY2020) and 91 percent (FY2021). To incentivize NWC to meet its collect rate targets, NWC's deemed K-Factor billing targets are set at the same levels. For instance, in FY2019 and FY2020, NWC proposes that it shall account for the deemed K-factor cash inflows based on 90 percent of the K-factor billing. This means that NWC would be required to deposit into the K-Factor bank account 90 percent of billed K-Factor revenue. NWC is incentivized to maintain a collection ratio at or above 90 percent; otherwise, non-K-Factor revenue intended to cover NWC's cost of service would need to be diverted into the K-Factor bank account.

For the profitability, efficiency, and bankability objectives, the targets for FY2020 (April 2019 to March 2020) have been set based on NWC's anticipated financial performance under the proposed tariffs set out in Section 8. The targets for FY2019 (April 2018 to March 2019) have been set lower, to reflect that the proposed tariffs will go into effect in the middle of the financial year. After FY2020, NWC aims to maintain its target performance levels.

For the liquidity objectives, NWC has two quick ratio measures. NWC's current quick ratio is 0.4 and quick ratio* is 0.8 (see Table 10.4 for definitions).[78] For FY2019, NWC aims to make

[78] See Table A.3

slight improvements of 0.2 and 0.1, respectively. From FY2020 onwards, NWC aims to improve its performance by 0.1 to 0.2 each year. The improvements are based on NWC being able to pay down its accounts payables once its cash flow improves, given that the tariffs charged will be closer to cost recovery.

For the gearing objective, NWC similarly proposes gradual improvements from its current level of 81 percent.

**Redundant targets to eliminate**

The bad debt ratio target is redundant, as it is the inverse of the collection rate target. NWC proposes to eliminate this redundancy by dropping the bad debt target and focusing on the collection rate target.

The current 'net profit margin' target (operating profit divided by revenues) is the same as the EBITDA margin target (EBITDA divided by revenues). This is because EBITDA is equal to operating profit because interest, depreciation, and amortization are classified as 'other expenditure', not operating expenditure, in NWC's financial statements. As such, NWC proposes to eliminate the net profit margin target.

The staff efficiency target is included among the operational performance targets (see Section 10.3). To avoid redundancy and the risk of confusion, NWC propose to report the staff efficiency target among the operational performance targets, and not as a financial performance target.

## 10.3 Operational Performance Targets

Table 10.3 shows NWC's proposed operational performance targets for the new regulatory period. The first column shows the objective of each target, and the second column shows the way the objective will be measured. The third column describes whether the targets are maximums, minimums, or exact targets. The remaining columns show the proposed target values.

**Table 10.3: Operational Performance Targets**

| Objectives | Critical Measures | Definition | FY 2019 | FY 2020 | FY 2021 | FY 2022 |
|---|---|---|---|---|---|---|
| **Non-Revenue Water (NRW)** | NRW as % of Production (Max.) | 1 - (Billed Authorized Consumption/Total Water Production) | **73%** | **72%** | **71%** | **70%** |
| | NRW in liters per connection per day | Liters of NRW per active water connection per day | **1,736** | **1,648** | **1,566** | **1,489** |
| **Coverage** | Water and Sewer Coverage | Population with access to the service as a percentage of the total population (water) | **51%** | **53%** | **55%** | **57%** |
| | | Population with access to the service as a percentage of the total population (sewage) | **11%** | **13%** | **15%** | **17%** |

| Objectives | Critical Measures | Definition | FY 2019 | FY 2020 | FY 2021 | FY 2022 |
|---|---|---|---|---|---|---|
| **Water Quality** | Percentage of Compliance with IJAM Standards (Min.) | Percentage of Compliance with IJAM Standards | **99%** | **99%** | **99%** | **99%** |
| **Wastewater Quality** | Percentage of Compliance with NEPA Standards (Min.) | Percentage of Compliance with NEPA Standards | **100%** | **100%** | **100%** | **100%** |
| **Improving Billing** | Metering Level | Number of Water Connections with Functioning Meters EoY / Total Number of Active Water Connections EoY | **87%** | **87%** | **87%** | **87%** |
| **Improve Billing** | Percentage of Meters Read | Number of Meters Read / Total Meters | **97%** | **97%** | **97%** | **97%** |
| **Increase Staff Efficiency** | Staff Efficiency | Number of Water and Sewage Employees / Number of Water Connections (in 1000) | **4.9** | **4.8** | **4.7** | **4.6** |
| **Increase Staff Efficiency** | Staff Efficiency Sewage | Number of Sewage Employees / Number of Sewage Connections EoY (in '000) | **1.4** | **1.4** | **1.4** | **1.4** |
| **Increase Energy Efficiency** | Energy Efficiency | Total MWh Consumption / System Input Volume (IG Millions) | **2.1** | **2.1** | **2.1** | **2.1** |

### Targets to adjust

NWC proposes that the NRW percentage target in FY2019 should be to maintain NRW at the current level (73 percent). Subsequently, NWC will aim to reduce NRW by 1 percentage point per year. NWC recognizes that NRW reduction is an important area of operational improvement. As set out in Section 1.5, improvements will be gradual, so proposed targets should be realistic.

NWC also proposes to introduce a volumetric NRW target, measured in liters per connection per day. The target for FY2019 will also be for NWC to maintain current NRW levels, at 1,736 liters per connection per day.[79] Thereafter, NWC proposes gradual reductions for the remainder of the tariff period.

For staff efficiency measures, NWC also proposes gradual improvements from its current performance level (5.0 employees per 1,000 water connections). The aim is to reduce this ratio

[79] Current NRW = 52,331,948,674 IG/year. This is equivalent to 237,906,017,094 liters/year. With 375,493 active water connections and 365 days in a year, the NRW is 237,906,017,094/375,493/365=1,736 liters per connection per day

by 0.1 each year, with the aim of reaching the targets that the OUR has currently set by FY2022. NWC can achieve this staff efficiency improvement by aiming to increase its number of active water connections without increasing staff numbers.

For coverage. NWC proposes starting with existing coverage levels in FY2019 (51 percent water coverage and 11 percent sewerage coverage),[80] and targeting gradual increases each year.

**Targets to maintain at current levels**

The water quality, wastewater quality, metering, staff efficiency sewage, and energy efficiency targets are proposed to remain at the current target levels.

**Redundant targets to eliminate**

NWC proposes eliminating three redundant performance indicators as what they measure is already covered by other performance indicators:

- 'Functioning meters' is proposed to be eliminated as it shares the same definition as 'metering level'
- 'Percentage of meters read in each billing cycle' is proposed to be eliminated as it shares the same definition as 'percentage of meters read'
- Days of sales outstanding is proposed to be eliminated as it is included among the financial performance targets and does not need to be repeated as an operational performance target.

## 10.4 Quality of Service Targets

NWC currently has four quality of service targets. We propose keeping two targets and eliminating two targets.

**Targets to maintain at current levels**

The water pressure and time to repair leaks targets should be retained. The targets should remain at existing levels:

- 20 to 60 psi water pressure for each year of the regulatory period
- 95 percent of leaks repaired within 3 days for each year of the regulatory period.

**Targets to eliminate**

The water quality and effluent quality targets should be eliminated. The critical measure for this target is to "provide information quarterly relating to the measures implemented to control, on an ongoing basis, the level of manganese chloride in the affected wells in St. Catherine."[81] This measure refers to a specific incidence at the time of the previous tariff determination and is not applicable for this upcoming regulatory period. The effluent quality target repeats the wastewater quality target that is already part of NWC's operational performance targets (which NWC proposes to retain).

[80] Coverage calculated as number of connections x average number of people per household / total population.

[81] OUR. "Regulatory Framework for the National Water Commission (October 2013 – September 2018)", 7. 1 April 2015.

## 10.5 Glossary

The OUR has defined some critical measures for NWC's performance targets. These definitions are included in its regulatory framework for NWC.[82] For some targets however, terms used in the critical measure are not clearly defined in the regulatory framework. In these instances, NWC has defined terms using common financial and operational definitions for water utilities.

Table 10.4 presents a glossary for terms used in the critical measures of NWC's performance targets.

**Table 10.4: Glossary for Critical Measures of NWC's Performance Targets**

| Term | Definition |
|---|---|
| Adjusted Equity | Equity according to the balance sheet plus the employee benefit obligations according to the balance sheet |
| Adjusted Liabilities | Total liabilities according to the balance sheet minus the employee benefit obligations |
| Bad Debt Ratio | Uncollectible revenue divided by billed revenue. Uncollectible revenue is equal to the bad debt line item in the "Supplementary Information" section of the financial statements |
| Collection Rate | Collected revenue divided by billed revenue |
| Days of Sales Outstanding | Net accounts receivable divided by total billed revenue times the number of days in the period (in this case, 365 days as there are 365 days in a year). Net accounts receivable is calculated as the difference between gross accounts receivable and impairment allowance |
| Debt Ratio | Adjusted liabilities divided by the sum of adjusted liabilities and adjusted equity |
| Debt Service Coverage Ratio | EBITDA divided by debt service |
| EBITDA | Earnings before interest, tax, depreciation and amortization. Earnings is equal to the net profit line item in the financial statements |
| EBITDA Margin | EBITDA divided by operating revenue |
| Net Profit Margin | Net profit divided by operating revenue |
| Net Profit (Loss) | Profit (loss) before other comprehensive income. Calculated as operating revenue minus operating expenses plus miscellaneous income minus other expenditure minus tax |
| Profit Margin | Net profit (loss) divided by billed revenue |
| Quick Ratio | Current assets (excluding inventories) divided by current liabilities |

[82] OUR. "Regulatory Framework for the National Water Commission (October 2013 – September 2018)", 1 April 2015.

| Term | Definition |
|---|---|
| Quick Ratio* | Current assets minus the inventories divided by the current liabilities (excluding the current portion of long-term debt) |
| Staff Efficiency | Total number of employees divided by thousands of active water connections |

Source: OUR. "Regulatory Framework for the National Water Commission (October 2013 – September 2018)", 1 April 2015.

# 11 Marginal Cost Analysis

To achieve maximum efficiency, the tariff regime should be fully cost-reflective, meaning tariffs would be set equal to marginal costs. This means the tariff paid by each customer, for both water and wastewater, would equal the cost to NWC of providing that customer with that service.

Setting tariffs equal to marginal costs would encourage customers to consume at efficient levels, to prevent the waste of water, energy and other valuable resources. If people pay less for water than it costs to provide that water, people will use water even when the value they get from the water is less than it costs to get the water to them.

To ensure that the proposed tariff is cost-reflective, NWC has assessed its marginal costs of supplying an additional unit of water and treating an additional unit of wastewater.

## 11.1 Methodology

NWC has calculated the marginal cost of supplying an additional unit of water using the Long Run Average Incremental Cost (LRAIC) method, defined as follows:

$$LRAIC = Long\ Run\ Average\ Incremental\ Capacity\ Cost + Average\ Variable\ Cost$$

$$Long\ Run\ Average\ Incremental\ Capacity\ Cost = \frac{Present\ Capacity\ Cost}{Present\ Volume\ of\ Additional\ Water\ Supplied}$$

The LRAIC is equal to the Long Run Average Incremental Capacity Cost plus the average variable cost. The Long Run Average Incremental Capacity Cost is equal to the present capacity cost divided by the present volume of additional water supplied.

NWC has calculated the inputs to the formula as follows:

- Present capacity cost is calculated by summing the present value of capital costs and the present value of fixed operating costs. Present values are obtained by discounting the costs in each year based on NWC's weighted average cost of capital, 7 percent, derived from Section 4.9.3
- Present capacity cost is divided by the present volume of additional water supplied. We use water supplied, not the capacity of the project, to reflect the fact that an over-sized project is of little value—it is the capacity to satisfy actual demand which is valuable. We use a present value measure to reflect that supplying more water today is more valuable than supply water at some point in the future
- The average variable cost, meaning the incremental cost in the short run due to supplying one more unit of water, is added to the quotient. Variable costs, unlike capacity costs, do vary with production in the short term. For a water utility, variable costs consist primarily of electricity and chemicals.

## 11.2 Marginal Cost of Providing an Additional Unit of Water

To estimate the marginal cost of providing an additional unit of water, we calculated the LRAIC for six water augmentation schemes that NWC is considering. Table 11.1 presents the capacity, capital costs, fixed annual operating costs, and operational years of the schemes.

The following six projects have been considered in this marginal cost analysis:

- Bogue WTP is in the parish of St. Ann. The estimated production at Bogue WTP is 8 million imperial gallons per day (MIGD). The Bogue expansion could provide additional bulk water supply of 8 MIGD
- The Martha Brae WTP draws water from the Martha Brae River in Trelawny parish. The Martha Brae WTP is currently only producing 8 MIGD out of its 11 MIGD design capacity. The Martha Brae minor works option could increase its current capacity by 3 MIGD
- The Martha Brae expansion could increase its capacity by a further 5 MIGD
- The Rio Bueno is a river on the border between the parishes of St. Ann and Trelawny. A site has been identified at which it is possible to build a new WTP with 15 MIGD capacity
- The Rio Cobre project is a proposed WTP on the Rio Cobre river in St. Catherine. Vinci approached NWC to construct the WTP and supply up to 15 MIGD under a PPP arrangement
- A pre-feasibility study showed that an NRW-PBC could reduce physical losses in the Northern Parishes by 1 MIGD in 2019, increasing to 5 MIGD of physical losses saved in 2023.

**Table 11.1: Inputs Used to Calculate Long Run Average Incremental Capacity Costs**

| Project | Capacity (IG/Day) | Total Capital Costs (JMD Millions)** | Fixed Operating Costs Per Year (JMD Millions) | Operational Years |
|---|---|---|---|---|
| Rio Bueno | 15,000,000 | 9,407 | 64 | 30 |
| Bogue Expansion | 8,000,000 | 4,531 | 8 | 30 |
| Martha Brae Minor Works | 3,000,000 | 787 | 13 | 30 |
| Martha Brae Expansion | 5,000,000 | 2,684 | 21 | 30 |
| Rio Cobre | 15,000,000 | N/A | 1,414 | 18 |
| Northern Parishes NRW Reduction* | 4,932,486 | 819 | 94 | 9 |

*The annual physical loss reduction has been used as a proxy for capacity. When calculating volume of water supplied, it is assumed that all water saved through physical loss reduction is sold to customers.

**It is assumed that capital costs are incurred over 3 years (to reflect construction over 3 years) for all projects except Martha Brae Minor Works and Northern Parishes NRW Reduction. Martha Brae Minor works is only expected to take 1 year to construct. It is expected that it will take 5 years for the NRW project to reach maximum loss reduction, although water savings will start to be achieved in year 1.

Source: Castalia. "Northern Parishes Water Supply Project: Pre-Feasibility Study to Assess Viability of PPP Transaction" April 2017.

"Content (Rio Cobre) Water Treatment Plant" Project Profile

For each project, the present value of capital costs is calculated based on an annuity payment using the capital cost of the plant, the life of the plant, and NWC's weighted average cost of capital (7 percent). For consistency, it is assumed that construction will begin in 2020 and take 3 years. Exceptions are the Martha Brae minor works, which is expected to take 1 year, and the Northern Parishes NRW Reduction, which is expected to take 5 years to reach full loss reduction (although minor savings will result from the first year).

For instance, the present value of capital costs for Rio Bueno is calculated by assuming the JMD9,407 million in capital costs are evenly divided across 3 years (JMD3,136 per year), from 2020 to 2022. These costs are discounted to today at 7 percent. The present value of fixed operating costs is calculated using the same methodology. The PV of capital costs is added to the PV of fixed operating costs to obtain present capacity cost.

To calculate the present volume of additional water supplied, the volume of additional water supplied in each year is discounted at 7 percent. The volume of additional water supplied in each year is estimated using the capacities, assuming reasonable NRW reductions. It is assumed that NRW is reduced in line with operational performance targets from 2019 to 2022 (see Section 10.3). Thereafter, straight line NRW reductions to 40 percent by 2035 and 25 percent by 2050 are assumed.

Table 11.2 shows the inputs used to derive the long run average incremental capacity cost for NWC.

**Table 11.2: Long Run Average Incremental Capacity Cost for NWC**

| Project | Present Value of Capital Costs (JMD Millions) | Present Value of Fixed Operating Costs (JMD Millions) | Present Capacity Cost (JMD Millions) | Present Volume of Additional Water Supplied (IG Millions) | Long Run Average Incremental Capacity Cost (JMD / 1,000 IG) |
|---|---|---|---|---|---|
| Rio Bueno | 7,180 | 563 | 7,743 | 24,649 | 314 |
| Bogue Expansion | 3,459 | 74 | 3,533 | 13,146 | 269 |
| Martha Brae Minor Works | 642 | 129 | 771 | 5,245 | 147 |
| Martha Brae Expansion | 2,049 | 188 | 2,236 | 8,216 | 272 |
| Rio Cobre* | N/A | N/A | 10,109 | 18,231 | 555 |
| Northern Parishes NRW Reduction | 913 | 382 | 1,295 | 11,352 | 114 |
| **Weighted Average** | **2,374** | **1,907** | **4,281** | **13,473** | **318** |

*Rio Cobre will be operated as a public-private partnership where the private contractor pays the capital costs and operating costs up front. Costs to NWC will be governed by a water purchase agreement (WPA). As such, the annual capacity cost is based on the terms of the WPA.

Source: See Table 11.1.

### Variable costs

To the long run average incremental capacity cost we add variable costs, meaning costs that vary with production. For Rio Bueno, Bogue, and Martha Brae, the variable costs are estimated to be NWC's chemical costs and electricity costs per 1,000 IG of water consumed.[83]

$$Variable\ Cost\ = \frac{Electricity\ Cost + Chemical\ Cost}{Volume\ of\ Water\ Consumed} = \frac{JMD6{,}426{,}264{,}000 + JMD231{,}168{,}000}{19{,}160{,}703{,}253\ IG}$$

$$= JMD347/1{,}000IG$$

The variable cost for Rio Cobre is taken from its water purchase agreement. This is JMD91/1,000 IG, divided into the following components: JMD59/1,000IG in energy costs, JMD7/1,000IG in maintenance costs, and JMD25/1,000 IG in chemical costs.

### Long run average incremental cost

The long run average incremental cost of providing an additional unit of water (JMD559/1,000 IG) is equal to the long run average incremental capacity cost (JMD318/1,000 IG) plus the average variable cost (JMD239/1,000 IG). Table 11.3 shows how the long run average incremental costs were calculated for each project.

**Table 11.3: Long Run Average Incremental Cost for NWC**

| Project | Long Run Average Incremental Capacity Cost (JMD / 1,000 IG) | Variable Cost (JMD/1,000IG) | Long Run Average Incremental Cost of Water Supplied (JMD / 1,000 IG) |
|---|---|---|---|
| Rio Bueno | 314 | 347 | 662 |
| Bogue Expansion | 269 | 347 | 616 |
| Martha Brae Minor Works | 147 | 347 | 494 |
| Martha Brae Expansion | 272 | 347 | 620 |
| Rio Cobre* | 555 | 91 | 645 |
| Northern Parishes NRW Reduction | 114 | N/A | 114 |
| **Weighted Average** | **318** | **239** | **559** |

Source: National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I-II. (pages 69, 70).

[83] National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I-II. (pages 69, 70).

## 11.3 Marginal Cost of Treating an Additional Unit of Wastewater

The marginal cost of treating an additional unit of wastewater was estimated by calculating the LRAIC for two schemes. The wastewater treatment plant (WWTP) at Anchovy, Portland is currently under construction, and is expected to provide 219,969IG/day in treatment capacity. The Soapberry WWTP is an existing WWTP operated by CWTC; NWC pays CWTC to use Soapberry to treat wastewater.

**Marginal cost of the Soapberry plant**

The LRAIC of wastewater treated at Soapberry is derived by taking the values in the 2013 Determination Notice for CWTC, and adjusting for PAM.

The OUR determined a fixed tariff of JMD392/$m^3$ per month of net available capacity at the capacity of 75,000$m^3$/day.[84] The OUR also determined flow volume per year was 13,444,470$m^3$. Based on a PAM-compensated increase of 21 percent,[85] the PAM-compensated fixed operating costs is JMD426/$m^3$ per month and the PAM-compensated capacity is 98,786$m^3$/day.

The fixed operating cost can thus be expressed as

$$Fixed\ Operating\ Costs = \frac{\frac{Fixed\ Operating\ Costs\ per\ month}{Volume\ of\ Wastewater\ Flow\ per\ month}}{Plant\ Capacity}$$

$$Fixed\ Operating\ Costs = \frac{\frac{JMD426/m^3/month}{13{,}444{,}470m^3/12months}}{98{,}796m^3/day} = JMD37.54/m^3$$

Converting from metric to imperial,

$$Fixed\ Operating\ Costs = JMD37.54/m^3 x\ 4.5461 IG/m^3 = JMD171/1{,}000 IG$$

To the long run average incremental capacity cost we add variable costs. For Soapberry, the variable cost is determined as JMD46/$m^3$ in CWTC's determination notice. Based on a PAM-compensated increase of 21 percent, the PAM-compensated variable cost is JMD56/$m^3$, or JMD253/1,000 IG.[86]

**Marginal Cost of the Anchovy, Portland WWTP**

The WWTP at Anchovy, Portland is expected to cost JMD1,010 million in capital costs. Construction is spread over 2018 and 2019, with JMD573 million of capital costs incurred in 2018 and JMD437 million to be incurred in 2019. With a WACC of 7 percent, the present value of capital costs is JMD917 million.

The project is expected to have fixed operating costs of JMD2 million per year, from 2020 to 2049. Discounted at 7 percent, the present value of fixed operating costs is JMD23 million.

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[84] OUR. "Central Waste Water Treatment Company Limited (CWTC) Rates for sewerage treatment services provided to the National Water Commission: Determination Notice", 32. 30 August 2013.

[85] This is the adjustment in baseline NWC tariffs over the tariff period. According to page 34 of the OUR's 2013 Determination Notice for CWTC, "The Office has determined that a PAM equivalent to that of NWC (as specified above) should be applied to CWTC's base rate one month after it is applied by the NWC. This is appropriate since the nature of both businesses is similar and there are common costs that are borne by both companies."

[86] OUR. "Central Waste Water Treatment Company Limited (CWTC) Rates for sewerage treatment services provided to the National Water Commission: Determination Notice", 32. 30 August 2013.

Summing the present value of fixed operating costs and the present value of capital costs, the present capacity cost on this project is JMD939 million.

The plant has a planned capacity of 219,969 IG/day. Multiplying by 365 days per year, this is equivalent to 80 million IG/year. Discounted at 7 percent, the present volume of additional wastewater treated is 867 million IG.

The long run average incremental capacity cost (JMD1,083/1,000 IG) is then derived by dividing the present capacity cost (JMD939 million) by the present volume of additional wastewater treated (867 million IG).

The variable cost for the Anchovy, Portland WWTP is taken as NWC's current variable costs. This is NWC's chemical costs and electricity costs per 1,000 IG of wastewater treated.[87]

$$Variable\ Cost = \frac{Electricity\ Cost + Chemical\ Cost}{Volume\ of\ Wasteater\ Treated} = \frac{JMD498{,}149{,}000 + JMD18{,}987{,}000}{5{,}822{,}343{,}331\ IG}$$

$$= JMD89/1{,}000IG$$

**Summary**

The long run average incremental cost of treating an additional unit of wastewater is equal to the long run average incremental capacity cost (JMD226/1,000 IG) plus the average variable cost (JMD243/1,000 IG). NWC's long run average incremental cost is JMD468/1,000 IG

Table 11.4 summarizes the LRAICs for each project and their weighted average.

**Table 11.4: Long Run Average Incremental Cost of Sewage Treatment for NWC**

| Project | Long Run Average Incremental Capacity Cost (JMD / 1,000 IG) | Variable Cost (JMD/1,000IG) | Long Run Average Incremental Cost of Sewage Treated (JMD / 1,000 IG) |
|---|---|---|---|
| Soapberry | 171 | 253 | 423 |
| Anchovy, Portland WWTP | 1,083 | 89 | 1,172 |
| **Average** | **226** | **243** | **468** |

Source: OUR. "Central Waste Water Treatment Company Limited (CWTC) Rates for sewerage treatment services provided to the National Water Commission: Determination Notice". 30 August 2013.

NWC Capital Programme Implementation and Financial Plans for FY 2018/2019.

## 11.4 Comparison of Proposed Tariffs to Marginal Costs

As summarized in Table 11.5, the average proposed volumetric tariffs are higher than NWC's long run average incremental costs. Average volumetric water tariffs are JMD588/1,000 IG higher than the long run average incremental cost of providing an additional unit of water. Average volumetric sewerage tariffs are JMD881/1,000 IG higher than the long run average incremental cost of treating an additional unit of wastewater.

[87] National Water Commission. "Supplementary Information to the Financial Statements, Year Ended March 31, 2018", I-II. (pages 69, 70).

**Table 11.5: Comparison of Proposed Tariffs to Average Incremental Costs (JMD/1,000 IG)**

| | Water | Sewerage |
|---|---|---|
| Average Volumetric Tariff | 1,147 | 1,349 |
| Long Run Average Incremental Cost | 559 | 468 |
| **Difference** | **588** | **881** |

Source: Table 11.3 and Table 11.4.

Proposed volumetric tariffs are higher than NWC's long run average incremental costs because a large portion of NWC's cost of service is attributed to the capital costs and fixed operating costs of the distribution network, and providing customer services (whereas the LRAIC captures only the costs associated with production).

In principle, fixed costs should be recovered through fixed charges. This approach would see the costs of the network infrastructure and overheads recovered from customers through the service charges. This is economically efficient, and reduces the demand risk NWC faces. While NWC would like to move in this direction in the future, concerns about affordability of water and customers' ability to control their bill through controlling consumption mean that NWC has not reflected this change in this tariff submission.

Currently, introducing higher fixed service charges would make bills unaffordable for the poor. As shown in Table 8.7, increasing the existing service charge and lifeline volumetric tariff by just 5 percent results in the total water bill for basic needs consumption being slightly more than 5 percent of expenditure for a poor household. For this reason, NWC accepts the allocative efficiency losses entailed by pricing above LRAIC, for the time being.

# Appendix A: Assessment of the National Water Commission's Performance Against Standards and Targets Set by the Office of Utilities Regulation

The National Water Commission (NWC) aims to improve customer service, boost operational efficiency, and increase revenues and available cash. In May 2018, Castalia LLC was engaged to help deliver on these objectives by preparing a tariff submission**,** recommending a new corporate governance and business model, and advising on institutional strengthening.

This report assesses NWC's performance against standards and targets set by the Office of Utilities Regulation (OUR) in each financial year from 2014 to 2018.[88] This assessment will form part of NWC's tariff submission, and help NWC prioritize areas for institutional strengthening.

The standards and targets include Guaranteed Standards, financial performance targets, operational performance targets, and quality of service targets. These are set out in the OUR's Determination Notice of 2013,[89] Regulatory Framework of 2015,[90] and Mid-Tariff Determination Notice 2016.[91]

Table A.1 describes the standards and targets set by the OUR, and summarizes NWC's performance against them. NWC has generally performed well in meeting its Guaranteed Standards (Appendix A.1). However, despite showing progress on some indicators, NWC could improve its performance with regards to financial, operational, and quality of service targets (Appendix A.2, Appendix A.3, and Appendix A.4).

**Table A.1: Summary of NWC's Performance against Guaranteed Standards and Performance Targets**

| Standards and Targets Category | Examples of Indicators | Assessment of NWC's Performance |
|---|---|---|
| Guaranteed Standards | Access, delivery of bills, appointments, complaints, disconnections, reconnections, account status, water meters, compensation, estimation of consumption, and billing adjustments | ▪ Achieved 100 percent compliance for 9 of the 17 standards in 2018<br>▪ Achieved at least 99 percent compliance in each year for 10 of the 17 standards |
| Financial Performance Targets | Profitability, efficiency, liquidity, bankability, gearing | ▪ Met target for 3 of 15 indicators in 2018<br>▪ Did not meet target in any year for 10 of 15 indicators |

[88] Each financial year begins on 1 April of the previous year and ends on 31 March of the year indicated.

[89] Office of Utilities Regulation. "National Water Commission Review of Rates: Determination Notice". 1 October 2013.

[90] Office of Utilities Regulation. "Regulatory Framework for the National Water Commission (October 2013 – September 2018)". 1 April 2015.

[91] Office of Utilities Regulation. "National Water Commission Mid – Tariff Review 2016". 5 December 2016.

| Standards and Targets Category | Examples of Indicators | Assessment of NWC's Performance |
|---|---|---|
| Operational Performance Targets | Metering, non-revenue water (NRW), water and wastewater coverage, water and wastewater quality, staff efficiency, billing*, and energy efficiency | ▪ Met target for 3 of 14 indicators in 2018<br>▪ Did not meet target in any year for 8 of 14 indicators |
| Quality of Service Targets | Water quality**, effluent quality***, water pressure, and time to repair leaks | ▪ Met target for 1 of 4 indicators in 2018<br>▪ Did not meet target in any year for 2 of 4 indicator<br>▪ Did not track performance against 1 indicator |

*Days of Sales Outstanding is repeated under both financial performance targets and operational performance targets

**Note that water quality under quality of service targets focuses on St. Catherine, while water quality under operational performance targets is for all of Jamaica

***Effluent quality appears to be a repeat of the wastewater quality target under operational performance targets

Definitions for terms used in the Guaranteed Standards and performance targets are included in Appendix A.4.1.

## A.1 NWC Performs Well in Meeting its Guaranteed Standards

Guaranteed Standards are standards of service set by the OUR to ensure that the customers receive acceptable service delivery. Customers are entitled to compensation each time NWC fails to meet a Guaranteed Standard. For some standards, the customers are required to submit a claim to NWC to receive compensation. For other standards, a breach triggers automatic compensation.

NWC has generally performed well in meeting its Guaranteed Standards to customers. NWC achieved at least 99 percent compliance in every year under review for 10 of the 17 standards, and achieved 100 percent compliance for 9 of the 17 standards in 2018.

For 4 of the 15 standards, NWC's compliance rate was less than 90 percent in 1 or more years. The four standards are as follows:

- Reconnection after wrongful disconnection—Maximum of eight (8) hours after being notified of the error to reconnect a supply that was inadvertently disconnected. NWC complied in only 69 percent of cases in 2017 and 81 percent of cases in 2018
- Payment of compensation—Maximum of thirty (30) working days to process and apply credit to customer's account. NWC complied in only 88 percent of cases in 2016, 65 percent of cases in 2017, and 85 percent of cases in 2018
- Meter installation—Maximum of thirty (30) working days to install meter on customer's request. NWC complied in only 65 percent of cases in 2017
- Repair of replacement of faulty meters—Maximum of twenty (20) working days to verify, repair, or replace meter after defect is identified or reported. NWC complied in only 79 percent of cases in 2015.[92]

Table A.2 shows NWC's compliance with Guaranteed Standards in each financial year from 2014 to 2018. The first four columns in Table A.2 show the code, category, standard, and description of the standard. The column titled "Compensation Type" shows whether customers have to submit a claim after a breach occurred to receive compensation ("Claim"), or if a breach triggers automatic compensation ("Automatic"). Cells that are shaded in green mean that NWC was compliant with the standard in 98 percent or more of the cases. Cells shaded in yellow denote a compliance rate between 90 percent and 98 percent. Cells shaded in red mean that NWC complied with a standard less than 90 percent of the time.

[92] Castalia is currently awaiting information from NWC explaining why these guaranteed standards have not been met.

**Table A.2: NWC's Performance Against Guaranteed Standards**

| Code | Category | Standard | Description | Compensation Type | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|
| WGS1 | Access | Connection to Supply | Maximum of ten (10) working days to connect supply and install meter after establishment of contract. | Claim | 95% | 94% | 95% | 95% | 93% |
| WGS2 | Delivery of Bills | Issue of First Bill | Maximum of forty (40) working days after connection of supply. | Claim | 100% | 100% | 100% | 100% | 100% |
| WGS3 | Appointments | Issue of First Bill | Must make and keep an appointment at customer's request and must notify customer at least twenty-four (24) hours prior to the appointed time, if the appointment will not be kept. | Claim | 100% | 99% | 100% | 100% | 99% |
| WGS4(a) | Complaints | Acknowledgement | Maximum of five (5) working days to acknowledge customer written complaints after receipt. | Claim | 99% | 99% | 99% | 99% | 97% |
| WGS4(b) | Complaints | Investigations | Maximum of thirty (30) working days from the date of receipt of the complaint to complete investigation and respond or provide an update. | Claim | 99% | 97% | 97% | 99% | 100% |
| WGS5 | Disconnection | Wrongful Disconnection | Where the NWC disconnects a supply that has no overdue amount or is currently under investigation by the OUR or the NWC and only the disputed amount is in arrears. | Automatic | 100% | 100% | 100% | 100% | 100% |
| WGS6 | Account Status | Issue of Account Status | Meter to be read on same day customer is moving if on a weekday or within two (2) working days of move if on a weekend, provided five (5) working days' notice of move is given. Maximum time of fifteen (15) working days to provide final bill after move and forty-five (45) days to refund the credit balances. | Claim | 100% | 100% | 100% | 100% | 100% |
| WGS7 | Water Meters | Meter Installation | Maximum of thirty (30) working days to install meter on customer's written request. | Claim | 100% | 93% | 96% | 65% | 93% |
| WGS8 | Water Meters | Repair of Replacement of Faulty Meters | Maximum of twenty (20) working days to verify, repair or replace meter after defect is identified or reported. | Automatic | 99% | 79% | 94% | 98% | 94% |

| Code | Category | Standard | Description | Compensation Type | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|
| WGS9 | Water Meters | Changing Meters | NWC must provide customer with details of the date of the change, the reading on the old meter on the day and serial number of the new meter. | Claim | 100% | 99% | 100% | 100% | 99% |
| WGS10(a) | Water Meters | Meter Reading | There Should NOT be more than two (2) consecutive estimated bills (where NWC has access to meter). | Automatic | 100% | 100% | 100% | 100% | 100% |
| WGS10(b) | Water Meters | Exceptional Meter Reading | Where the NWC obtains a reading that falls within its exceptions criteria (60% high and 40% low), same is to be verified, the customer alerted upon verification and the reading applied to the customer's account within one (1) billing period. | Claim | 100% | 100% | 100% | 100% | 100% |
| WGS11 | Reconnection | Reconnection after Payment of Overdue Amount | Maximum of twenty-four (24) hours to restore supply | Automatic | 100% | 100% | 100% | 100% | 100% |
| WGS12 | Reconnection | Reconnection after Wrongful Disconnection | NWC must reconnect a supply that was inadvertently disconnected within eight (8) hours of being notified of the error. | Automatic | 91% | 94% | 90% | 69% | 81% |
| WGS13 | Compensation | Payment of Compensation | Maximum of thirty (30) working days to process and apply credit to customer's account. | Automatic | 97% | 96% | 88% | 65% | 85% |
| WGS14 | Estimation of Consumption | Method of Estimation | An estimated bill should be based on the average of the last three (3) readings. | Automatic | 100% | 100% | 100% | 100% | 100% |
| WGS15 | Billing Adjustment | Timeliness of Adjustment to Customer's Account | Where necessary, customer's account must be billed for an adjustment within three (3) months of (i) identification of error; or (ii) subsequent to replacement of faulty meter. | Claim | 100% | 100% | 100% | 100% | 100% |

Source: The information on NWC's actual performance is taken from the quarterly reports on Guaranteed Standards to the OUR. Castalia used the actual performance data for the financial years 2014 to 2018

## A.2 NWC Does Not Meet Most of its Financial Performance Targets

NWC did not meet most financial performance targets during the review period. In 2018, NWC did not meet 11 of its 15 financial performance targets. Of these, NWC's performance for 4 targets deteriorated in 2018 compared to 2017.

Table A.3 shows the financial performance targets set in the OUR's Regulatory Framework and NWC's performance against these targets. Cells shaded in green mean that NWC's performance was in line with or better than the target. Cells shaded in red mean that NWC's performance was below target. Unshaded cells mean that a target value was not prescribed.

**Table A.3: NWC's Performance Against Financial Performance Targets**

| Objective | Performance Target | Actual or Target | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|
| Receivables | Days of Sales Outstanding | Actual | 97 | 95 | 93 | 96 | 93 |
| | | Target (Max) | 30 | | | | |
| Employee Efficiency | Staff Efficiency | Actual | 5.6 | 5.5 | 5.2 | 5.1 | 5.0 |
| | | Target (Max) | - | 4.5 | | | |
| Billing and Collection | Collection Rate | Actual | 85% | 89% | 91% | 87% | 88% |
| | | Target (Min) | 92% | | | | |
| | Bad Debt Ratio | Actual | 12% | 11% | 11% | 12% | 11% |
| | | Target (Max) | 8% | | | | |
| Asset Valuation | Assets should reflect fair market valuation. | Actual | 100% | 0% | 0% | 0% | 0% |
| | | Target | 100% | | | | |
| X-factor | Whether or not it is deducted from the bill after the normal rates and PAM. | Actual | Yes | Yes | Yes | Yes | Yes |
| | | Target | Yes | | | | |
| K-factor | Account for deemed K-Factor cash inflows on the basis of 92% of K-Factor billing in a separate bank account. | Actual | 82% | 86% | 92% | 87% | 88% |
| | | Target | 92% | | | | 88% |
| K-factor Monitoring | NRW Reporting† | Actual | No | No | No | No | No |
| | | Target | Yes | | | | |
| Profitability | Profit Margin | Actual | -14% | -2% | -45% | 0% | 7% |
| | | Target (Min) | 0% | 3% | 8% | 11% | 7% |
| | Net Profit Margin | Actual | -29% | -5% | -17% | -7% | -2% |
| | | Target (Min) | 5% | 7% | 9% | 9% | - |
| Efficiency | EBITDA Margin | Actual | 11% | 14% | 15% | 11% | 10% |
| | | Target (Min) | 33% | 36% | 41% | 45% | 44% |
| Liquidity | Quick Ratio | Actual | 0.87 | 0.75 | 0.75 | 0.72 | 0.39 |
| | | Target (Min) | 1.2 | | | | |
| | Quick Ratio* | Actual | 1.14 | 0.98 | 0.97 | 0.97 | 0.80 |
| | | Target (Min) | 1 | 1.1 | 1.2 | | |
| Bankability | Debt Service Coverage Ratio | Actual | 1.10 | 1.13 | 1.12 | 0.61 | 0.59 |
| | | Target (Min) | 2.5 | | | | |
| Gearing | Debt Ratio | Actual | 64% | 65% | 82% | 82% | 80% |

| Objective | Performance Target | Actual or Target | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|
| | | Target (Max) | 55% | | | | |

Note: † The NWC is required to submit quarterly reports to the OUR on the impact of the K-Factor program on overall NRW-reduction.

*Excluding the current portion of long-term debt from currently liabilities

Source: Performance Targets taken from OUR Regulatory Framework for the National Water Commission (2013 – 2018), 1 April 2015.

NWC Financial Statements 2014-2018.

NWC has not met its profit targets, although its performance has been improving. In 2018, NWC's **profit margin** met the target of 7 percent mostly due to a one-time actuarial adjustment. **Net profit margin** (calculated before the actuarial adjustment) was low in 2018 at negative 2 percent, although improved compared to 2014 (negative 29 percent). Furthermore, NWC has missed the **EBITDA margin** target in each year, and has not made any improvements during the period under review.

NWC's ability to cover its cash needs has been compromised as it has not reached target performance on billing and collection. NWC's **collection rate** has fluctuated from year to year, but never met or surpassed the target of 92 percent. NWC came closest to meeting the target in 2016, with a 91 percent collection rate. This increase was due to a payment compliance initiative introduced in July 2015,[93] which consisted of the following two components:

- An early payment incentive of JMD250 for customers who make full payments on or before the stipulated due dates
- A late payment fee of JMD250 for customers who have not paid the bill in full by the day following the due date.

However, the collection rate slipped significantly to 79 percent in 2017. Curiously, revenue from lay payment fee actually more than halved from 2016 to 2017, while payouts from early fee imitative almost doubled. In the 2018 financial year, NWC's collection rate was 88 percent. Correspondingly, **bad debt** has remained at 11 percent to 12 percent each year, above the performance target of 8 percent.

In addition to not collecting the targeted amount, NWC has also struggled to collect within the targeted time period. **Days of sales outstanding** has remained high at over 90 days, far above NWC's target of 30 days or lower. The Jamaican Government is NWC's largest debtor; three of NWC's five largest debtors, including the single largest debtor, are government agencies.

Challenges with collections has affected NWC's liquidity. Its **quick ratio** (which measures NWC's ability cover current liabilities) has remained below 1.0.

In addition, NWC has not reached its target **debt service coverage ratio (DSCR)** of 2.5 in any year. In fact, in recent years NWC has not generated enough revenue to cover loan interest

[93] Office of Utilities Regulation. "Determination Notice: National Water Commission – Payment Compliance Initiative." 28 July 2015.

and debt repayment, with its DSCR falling to 0.59 in 2018. NWC plans to refinance some of its debt with a JMD12 billion bond, which NWC would use to reduce its loan interest payments. NWC's low DSCR is partly caused by its high gearing, as this means a large percentage of its capital is debt. NWC's **gearing** has remained above its target of 55 percent, reaching 80 percent in 2018.

## A.3 The NWC Does Not Meet Many Operational Performance Targets

In OUR's Regulatory Framework, operational performance targets were established for NWC. In the 2018 financial year, NWC did not meet 7 of its 14 operational performance targets. For some targets, it has not recorded the data required to track its performance.

Table A.4 shows NWC's performance against these operational targets. Cells shaded in green mean that NWC's performance was in line with or better than the target. Cells shaded in red mean that NWC's performance was below target.

**Table A.4: NWC's Performance Against Operational Performance Targets**

| Objectives | Performance Target | Definition | Actual or Target | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|
| **Non-Revenue Water (NRW)** | NRW as % of Production (Max.) | 1 - (Billed Authorized Consumption/Total Water Production) | Actual | 74% | 74% | 69% | 72% | 74% |
| | | | Target | - | - | 55% | 68.5% | 67.5% |
| **Coverage** | Water and Sewer Coverage | Population with access to the service as a percentage of the total population (water) | Actual | 38% | 37% | 38% | 39% | 40% |
| | | | Target | - | - | - | - | - |
| | | Population with access to the service as a percentage of the total population (sewage) | Actual | 11% | 11% | 11% | 12% | 12% |
| | | | Target | - | - | - | - | - |
| **Water Quality** | Percentage of Compliance with IJAM Standards (Min.) | Percentage of Compliance with IJAM Standards | Actual | 98% | 97% | 96% | 96% | 96% |
| | | | Target | 99% | 99% | 99% | 99% | 99% |
| **Wastewater Quality** | Percentage of Compliance with NEPA Standards (Min.) | Percentage of Compliance with NEPA Standards | Actual | 40% | 38% | 38% | 35% | 46% |
| | | | Target | - | 100% | 100% | 100% | 100% |
| **Improving Billing** | Metering Level | Number of Water Connections with Functioning Meters EoY / Total Number of Active Water Connections EoY | Actual | - | - | - | - | 87% |
| | | | Target | 84% | 85% | 85% | 86% | 87% |
| | Functioning Meters | Accounts with Functioning Meters/Total Accounts | Actual | - | - | - | - | - |
| | | | Target | - | - | 90% | 90% | 90% |
| **Improve Billing** | Percentage of Meters Read | Number of Meters Read / Total Meters | Actual | 97% | 97% | 96% | 94% | - |
| | | | Target | 92% | 95% | 97% | 97% | 97% |
| | Percentage of Meters Read in each Billing Cycle | Number of Meters Read / Total Meters | Actual | 97% | 97% | 96% | 94% | - |
| | | | Target | 97% | 97% | 97% | 97% | 97% |
| **Improve Billing** | Days of Sales Outstanding | Net Accounts Receivable EoY / Billed Revenue (365) | Actual | 97 | 65 | 88 | 97 | 95 |
| | | | Target | 50 | 50 | 50 | 50 | 50 |
| | | | Actual | 97 | 65 | 88 | 97 | 95 |

| Objectives | Performance Target | Definition | Actual or Target | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|
| | Days of Sales Outstanding | Accounts Receivables / Total Credit Sales * Number of Days | Target | - | - | - | 45 | 45 |
| **Increase Staff Efficiency** | Staff Efficiency | Number of Employees / Number of Connections (in 1,000) | Actual | 5.6 | 5.5 | 5.2 | 5.1 | 5.0 |
| | | | Target | - | - | - | 4.5 | 4.5 |
| **Increase Staff Efficiency** | Staff Efficiency Sewage | Number of Sewage Employees/ Number of Sewage Connections (in 1,000) | Actual | 1.3 | 1.2 | 1.4 | 1.3 | 1.4 |
| | | | Target | 2.3 | 2.1 | 2.0 | 1.9 | 1.8 |
| **Increase Energy Efficiency** | Energy Efficiency | Total MWh Consumption / System Input Volume | Actual | 3.01 | 2.88 | 3.00 | 2.89 | 2.64 |
| | | | Target | 3.0 | 2.8 | 2.6 | 2.3 | 2.1 |

Note: OUR's water and sewerage coverage targets are for 2020, as such NWC does not have performance targets for these indicators during this rate period.

Source: Performance Targets taken from OUR Regulatory Framework for the National Water Commission (2013 – 2018), 1 April 2015.

NWC Financial Statements 2014-2018.

NWC's operational performance helps explain the trends in its financial performance targets.

### Non-revenue water target

NWC has not reduced its NRW levels, which have generally remained above 70 percent during the review period. With lower NRW, NWC would sell more of the water it produces, leading to lower operating costs per unit of water sold and higher revenue. Although NWC's performance target was revised from 55 percent to 68.5 percent during its mid-term tariff review (2016), NWC has not been able to meet this adjusted target.

OUR has determined that for every 1 percent increase in average NRW in a given year, the X-Factor will be increased by 1 percent in the following year. NWC's NRW levels have increased since 2016, which led to an increase in the X-Factor. In December 2017, as a result of increase in NRW, the X-Factor was increased from 5.5 percent to 6.2 percent.[94]

As NWC has emphasized to the OUR, a percentage NRW target is not the best performance indicator to use. One major reason is that the NRW percentage is dependent on production levels—NRW percentage decreases if production decreases, assuming all other factors remain the same—making the percentage prone to fluctuation and manipulation. Instead, a volumetric indicator, such as imperial gallons per connection per day, better captures NRW performance.

[94] OUR. "National Water Commission Annual Price Adjustment Mechanism and X-Factor Application", 11. 11 December 2017.

**Other operational efficiency performance targets**

NWC reports on operational efficiency through the following performance targets:

- Metering—NWC's performance has been mixed:
  - NWC first reported on its metering level in 2018, and it reached its target metering level of 87 percent[95]
  - NWC reporting on percentage of meters read from 2014 to 2017. In 2017, NWC only read 94 percent of its meters, below its target of 97 percent
- Energy efficiency—NWC has not reached its target. In the most recent year with data (2017), NWC consumed 2.89MWh of electricity per 1,000 imperial gallons (IG) of water produced, above its target of 2.3MWh per 1,000 IG
- Staff efficiency—NWC's performance has improved from 5.6 staff members per 1,000 connections in 2014 to 5.0 in 2018. However, this remains higher than its performance target of 4.5. On a positive note, NWC's wastewater staff efficiency is good, at 1.4 wastewater staff members per 1,000 wastewater connections, below its target of 1.8.

**Quality targets**

Finally, NWC has not met its targets on water and wastewater quality. NWC has achieved 96 percent compliance with the Interim Jamaica Standards for Drinking Water (IJAM) for the last 3 years, below the target of 99 percent compliance. A significant reason is the low water quality compliance rate in rural St. Andrew, caused by technological challenges as well as the prevalence of leeching from agricultural enterprises.

The wastewater quality performance target is for all wastewater treatment plants to be 100 percent compliant with NEPA standards. NWC's performance has lagged far below this target, only reaching 46 percent compliance in 2018.

[95] It is unclear if NWC has consistently reached its target, as it did not track its metering levels or number of functioning meters in previous years.

## A.4 NWC's Performance on Quality of Service Targets is Mixed

NWC's quality of service targets cover water and effluent quality, water pressure, and time to repair leaks. NWC met its water pressure target in the last two years, but has not met targets for water and effluent quality. NWC does not have the data required to track its performance against the target of 95 percent of leaks being repaired within 3 days.

Table A.5 shows NWC's performance on these quality of service targets. Cells shaded in green mean that NWC's performance was in line with the target or better than expected. Cells shaded in red mean that NWC's performance was below target.

**Table A.5: NWC's Performance Against Quality of Service Targets**

| Objectives | Performance Target | Actual or Target | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|
| Water Quality | Provide information quarterly relating to the measures implemented to control, on an ongoing basis, the level of manganese chloride in the affected wells in St. Catherine | Actual | Did not | Did not | Did not | Did not | Did not |
| | | Target | Provide information each quarter | | | | |
| Effluent Quality | Percentage Compliance with NEPA Standards | Actual | 40% | 38% | 38% | 35% | 46% |
| | | Target | 100% | | | | |
| Water Pressure | Water Pressure (psi) | Actual | - | - | - | 42.2 | 42.2 |
| | | Target | 20 – 60 | | | | |
| Time to Repair Leaks | Percentage of leaks repaired within 3 days | Actual | - | - | - | - | - |
| | | Target | 95% | | | | |

Source: Performance Targets taken from OUR Regulatory Framework for the National Water Commission (2013 – 2018), 1 April 2015.

The OUR asked NWC to report on the level of manganese chloride in the affected wells in St. Catherine, following complaints. This requirement has not been adhered to.

On a positive note, NWC's water pressure in the last 2 years has been 42.2 pressure per square inch (psi), which meets OUR's target of maintain a water pressure between 20psi to 60psi.

### A.4.1 : Glossary

| Term | Definition |
|---|---|
| Adjusted Equity | Equity according to the balance sheet plus the employee benefit obligations according to the balance sheet |
| Adjusted Liabilities | Total liabilities according to the balance sheet minus the employee benefit obligations |
| Bad Debt Ratio | Uncollectible revenue divided by billed revenue. Uncollectible revenue is equal to the bad debt line item in the "Supplementary Information" section of the financial statements |
| Collection Rate | Collected revenue divided by billed revenue |
| Days of Sales Outstanding | Net accounts receivable divided by total billed revenue times the number of days in the period (in this case, 365 days as there are 365 days in a year). Net accounts receivable is calculated as the difference between gross accounts receivable and impairment allowance |
| Debt Ratio | Adjusted liabilities divided by the sum of adjusted liabilities and adjusted equity |
| Debt Service Coverage Ratio | EBITDA divided by debt service |
| EBITDA | Earnings before interest, tax, depreciation and amortization. Earnings is equal to the net profit line item in the financial statements |
| EBITDA Margin | EBITDA divided by operating revenue |
| Net Profit Margin | Net profit divided by operating revenue |
| Net Profit (Loss) | Profit (loss) before other comprehensive income. Calculated as operating revenue minus operating expenses plus miscellaneous income minus other expenditure minus tax |
| Profit Margin | Net profit (loss) divided by billed revenue |
| Quick Ratio | Current assets (excluding inventories) divided by current liabilities |
| Quick Ratio* | Current assets minus the inventories divided by the current liabilities (excluding the current portion of long-term debt). |
| Staff Efficiency | Total number of employees divided by thousands of active water connections |

# Appendix B: Project Profiles

[Placeholder for NWC to insert project profiles]

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