

Construction Tender Reporting Automation (NRM2 Guidelines)

Standard Tender Documentation Structure

- **Bills of Quantities / Schedules of Work:** Under RICS NRM2, quantity surveyors prepare measured work schedules (Bills of Quantities) or quantified schedules of work from the project drawings and specifications. These are tabulated lists of all work items (with quantities, units, rates and totals) that contractors price in a tender. In traditional contracts the employer's QS provides a firm BoQ, whereas in design-and-build the contractor or their work-package QS often compiles the schedule from the employer's requirements. In practice, a "Schedule of Work" may be either a fully quantified list or an unquantified task list (to be filled in by bidders). The app should support generating either form according to the procurement strategy.
- **Elemental Price Breakdown:** Many clients require an elemental cost analysis. NRM2 allows an **elemental breakdown** where measured works are grouped by main cost elements (e.g. Facilitating Works, Substructure, Superstructure, Finishes, Services). For example, NRM2 Appendix A (Figure A.1) shows an elemental structure with Bill No. 1: Preliminaries, Bill 2: Facilitating Works, Bill 3: Substructure, Bill 4: Superstructure, Bill 5: Internal Finishes, etc. The app should be able to produce either an elemental or an alternative grouping as required (for instance by building block or trade). Templates in NRM2 (Appendices D/E) illustrate how to present each element's subtotal on a summary sheet. In the automated output, each elemental group can be a separate sheet or section, with subtotal formulas feeding into the summary.
- **Tender Summary Sheet:** The **main summary** (or tender summary) sheet lists the totals of each Bill/section and the overall contract sum. For an elemental BoQ, NRM2 suggests the summary should include the total of Preliminaries, each elemental section (or work section), Contractor-Designed Works, Risks, Provisional Sums (defined and undefined), Statutory Works (if any), Overheads & Profit, and the Final Total. For a work-section breakdown, it would list each work section instead. The app should automatically compile this summary by summing the subtotals from each section sheet. For example, cell formulas on the Summary sheet can reference the subtotal cells on the Preliminaries, Measured Works, Risks and Provisional Sums sheets to fill in these lines.
- **Preliminaries:** Preliminaries capture site-wide costs (site establishment, site management, temporary works, insurances, etc.) that are not part of any specific measureable item. NRM2 divides Preliminaries into two parts: an "*Information and requirements*" section (descriptive text) and a "*Pricing schedule*" where the contractor fills in their rates. The Pricing Schedule is typically organized into cost-centers (e.g. Employer's Requirements, Main Contractor's prelims). The app should generate a Preliminaries sheet with appropriate headings (following NRM2 Appendix B/C format) and allow entry of prices in adjacent columns. Since QS cannot accurately measure many preliminary items, the Pricing Schedule usually leaves quantities blank or as 1, so that the contractor can input their total charge. Formulas can then sum these to give the Preliminaries subtotal for the summary.

- **Risk Items:** Any identifiable construction risk (for which an allowance is made) is handled separately. NRM2 specifies that construction risk items (e.g. unknown ground conditions, latent defects) be listed in a **"Schedule of Construction Risks"**. This is a separate table (or sheet) where each risk is described with an allowance. The total of all risk allowances is then carried into the main summary as the "Risks" line. The app should provide a worksheet for Risk Schedule entries. For example, each row could have "Risk Description" and "Allowance (£)" columns. A formula on the Summary sheet would link to the sum of the Allowances column (e.g. `=SUM(Risks!B2:B10)`).
- **Contractor-Designed Works (CDW):** Items that are to be designed by the contractor (rather than by the employer's design team) are included in the BoQ but flagged as "Contractor Designed Work." NRM2 instructs that these be placed **after** the measured work items in the same bill, under a separate heading "Contractor Designed Work". (A price analysis of such items is often provided by the contractor at tender return.) In the app's output, each applicable sheet should include a subheading "Contractor Designed Works" beneath the last measured item, followed by any CDW items. Those rows should follow the same format (Qty, Unit, Rate, Total) so they appear seamlessly in the cost column summation, but can be shaded or prefixed (via coding) to distinguish them if desired.
- **Provisional Sums:** Provisional sums are allowances for work not fully defined (either *defined* or *undefined*). NRM2 requires that provisional sums be listed and described in a **separate Provisional Sums bill**. This means the app should create a standalone sheet (or at least a distinct section) titled "Provisional Sums." Each provisional sum entry has a description and amount. There are often subsections for *Defined* and *Undefined* sums. The sheet's total (sum of all provisional sums) is then linked back into the main summary. NRM2 Appendix F provides a template example: the app's Provisional Sums sheet can mirror this format for clarity.

Industry Variations and Hybrid Practices

Industry practice often customizes the above structure. For example, the provided Excel samples use non-standard section names and groupings: the Eastwood Estate workbook has sheets like *"B – Design and Development Costs"* and *"G – Aftercare"*, while the Haslingden file uses trade-coded sheets (Plot Groundworks, M&E, Carpentry, etc.). The app should accommodate such variations by allowing fully custom bill names and ordering. It should also support extra columns or annotations that QS typically add. In practice, BQs often include columns for *Drawing Ref*, *Specification Section*, *Risk Category*, or *Notes*, in addition to Qty/Unit/Rate. Some firms insert narrative paragraphs or qualification statements either within item descriptions or as separate sheets (e.g. "Tender Instructions" or "Contractor's Proposals"). Therefore, the output template should be configurable: users must be able to add/remove columns, merge cells for text, or adjust column headers. The tool should treat any additional text (notes, clarifications) as editable fields.

Converting Project Inputs to Quantified Entries

The automation from project data to BoQ involves distinguishing measurable from non-measurable scope:

- **Measured Items:** Geometry from drawings (e.g. lengths of walls, areas of floors, counts of fittings) must be converted to quantities. For example, a 3D model or 2D CAD can yield surface areas (m²) or volumes (m³), which the app would place in the Quantity and Unit columns. NRM2 rules ensure consistent units (e.g. area is in m² even if the drawing scale is metric). The specification text defines the nature of each item (e.g. "supply and fix 150mm brickwork"), which the app combines with quantities to

form each line entry. As quantities are entered, the app can prompt for the appropriate unit (e.g. m², m, no., etc.).

- **Non-Quantifiable Items:** Certain inputs (site offices, supervision time, special consultancy fees) cannot be directly measured from drawings. These typically become Preliminaries or lump-sum items. The app should allow such items to be entered with Qty = 1 or left blank (indicating a pure sum) and placed in the Preliminaries schedule or “Measured Work” section as a descriptive line. Design-team allowances, overhead percentages, or lump-sum payments are handled similarly.
- **Provisional and Contingent Work:** Consultants’ notes often include potential future works (e.g. “possible rainwater harvesting – to be determined”). Such items should be recorded as provisional sums or contingencies. The app should flag them for inclusion in the Provisional Sums schedule. For example, if the spec calls for “allow £10k for temporary works”, the app could automatically place a £10,000 line in the Provisional Sums sheet with a link description.
- **Traceability:** To maintain traceability, the app can link each BoQ item back to its source input. This might be a hyperlink or code for the drawing mark, or a reference to a spec clause. While NRM2 doesn’t enforce this, it’s common practice. The app could include an optional “Source” column where users note “Drawing 2, Detail A” or “Spec Sec. 3.2”.

Artifacts: Editable Excel and PDF Output

- **Excel Workbook (Editable):** The primary deliverable is an editable Excel file. It should contain: a cover or front sheet (project data and instructions), the Main Summary sheet, and separate sheets/bills for Preliminaries, each work section (element or trade), Risks, Provisional Sums, etc. Each sheet lists line items with (at least) these columns: **Item Description, Quantity, Unit, Rate, Total**. Additional columns (e.g. **Code, Drawing Ref, Notes**) should be optional. Cell formulas must compute Totals (Quantity × Rate) and section subtotals. The sheets should be formatted for easy editing: use Excel tables or named ranges so rows can be inserted, with totals auto-updating. For example, each section can be set up as an Excel table with total rows, or use dynamic SUM ranges that expand. Conditional formatting or cell styles may be used to distinguish header rows. The Excel should be fully unlocked so the user can enter rates and descriptions freely.
- **Printable PDF Report:** In addition to the working Excel, the app should generate a polished PDF report of the tender. This PDF should include a title page (project title, address, bid deadline, QS name), a contents/summary page with totals by section, and the detailed schedules in table format. It should mirror the Excel layout (same column headings and groupings) but with professional styling (consistent fonts, logos, page headers/footers). Page breaks should occur at logical points (e.g. each major Bill starts on a new PDF page). Any instructions or qualifications included in the Excel should appear in the PDF (e.g. as a separate section at the end or as footnotes). Automating this might involve exporting each sheet to PDF and combining, or using a reporting engine that reads the Excel data.

Formatting Guidance and Linking

- **Grouping and Subtotals:** Use Excel’s outlining to group trades or packages. For instance, all items in “Block N1” can be grouped so they collapse under a summary row. Subtotal rows should be inserted after each group to sum the group (using `SUBTOTAL` or `SUM`). Those subtotal cells can be linked to the Summary sheet. For example, if Block N1 items are in rows 10–20, row 21 might have `=SUBTOTAL(9,A10:A20)` (summing that block’s totals), and the Summary sheet cell for “Block N1 Total” could be `=Sheet1!D21`. Similar linking is used for Preliminaries and Risk totals.

- **Risk and Provisional Linking:** As noted, the Risk sheet and Provisional Sums sheet each have their own totals. On the Main Summary, a cell labeled “Risk Allowance” should reference the sum of the Risk sheet (e.g. `=SUM(Risks!C:C)`). Likewise, “Total Provisional Sums” in the summary links to the sum of the Provisional sheet. This ensures any change in those worksheets updates the grand total automatically.
- **Column Formatting:** Quantities often use whole numbers or one decimal (e.g. “10”, “5.5”), while rates and totals use currency formatting with two decimals. The app should apply consistent number formats. Heading rows can be bold. Freeze the top row or first column to keep headers visible when scrolling. Use wrap text for long descriptions. Ensure wide columns for units (e.g. “m²”) and narrow ones for numbers if needed.
- **Editable Design:** The Excel should remain user-editable. For example, allow the QS to insert an extra line under a section if a new scope emerges. To prevent formula breakage, it may be best to use whole-column references or Excel Tables. If using Tables, placing the subtotal in the table’s Total Row will auto-adjust as rows are added. For non-table ranges, dynamic named ranges or OFFSET/SUM formulas can accommodate inserted rows.

NRM2 Template References

Developers should align the app’s output with RICS NRM2 templates and guidance: - **Appendix A (BoQ Guidance):** Provides guidance on BoQ breakdown structures. It illustrates elemental vs work-section vs work-package bill numbering. The app’s template builder can mirror these examples (for instance, offering an “Elemental Breakdown” template versus a “Work-Section Breakdown” template).

- **Appendix B/C (Preliminaries):** Contain layouts for preliminaries pricing schedules (condensed and expanded formats). These show typical cost-centre headings for main contract prelims. The Excel output’s Preliminaries sheet should follow one of these formats, with the same grouping and labels.

- **Appendix D/E (Elemental Summaries):** Show example summary sheets for elemental bills. Developers can use these as a guide for what columns and rows to include when summarizing elements on the Main Summary sheet.

- **Appendix F (Risks & Provisional Sums):** Provides templates for a Schedule of Provisional Sums and a Schedule of Construction Risks. The app’s dedicated Risk and Provisional worksheets should follow these formats (for example, list each provisional item and its value, with a total row) so that any client reviewing the report will recognize the standard layout.

Where possible, key details from NRM2 should be cited or mirrored. For example, in the generated report’s notes one might reference “(See RICS NRM2 Appendix F for allowance detail)” if appropriate.

Customization and Audit Features

- **User-Defined Fields & Structure:** The app should let users tailor the output format. This means adding or removing columns (e.g. a “Code” or “Type” column), renaming column headers, or reordering sections. A simple way is to maintain a metadata sheet or settings panel where the user selects which columns to include. For the breakdown, the app could allow the user to define a custom list of bills (with names and order) before generation.
- **Adjustable Work Breakdown:** Allow the user to choose the work breakdown structure (elemental vs trade vs location). This might be a setting at project setup. In the Excel, this could translate to prefilling the Bill titles (or sheet names) as defined by the user. If a user wants to insert a new Bill (e.g. “Bill E: Landscaping”), the tool should support adding it dynamically, including handling numbering or prefixes.

- **Change Tracking:** For audit purposes, the app should track changes to quantities, rates, or item additions. This could be implemented by enabling Excel's "Track Changes" feature, or by logging edits in a separate "Audit Trail" sheet (with columns for date, user, cell changed, old value, new value). Alternatively, the app could require saving a new version for each change and keep version history. The objective is that any modification to the tender report can be reviewed later – for instance, if a contractor asks why a quantity changed, the audit log shows who changed it and when.

By combining NRM2's structured approach with flexible output formatting, the app can generate professional tender documents (editable Excel workbooks and polished PDFs) that meet industry standards. The RICS guidance ensures all necessary components (prelims, risk, CD works, etc.) are present, while the customizable design accommodates real-world practice and enhances usability for quantity surveyors.

Sources: RICS *New Rules of Measurement 2* (Detailed Measurement for Building Works) – especially Part 2 and Appendices A–F.
