USER MANUAL

WaCT DATA COLLECTION TOOL

VERSION 1.31

JANUARY 2021

SURVEY TOOL EXCEL APPLICATION

How the WaCT Data Collection Tool Is Used

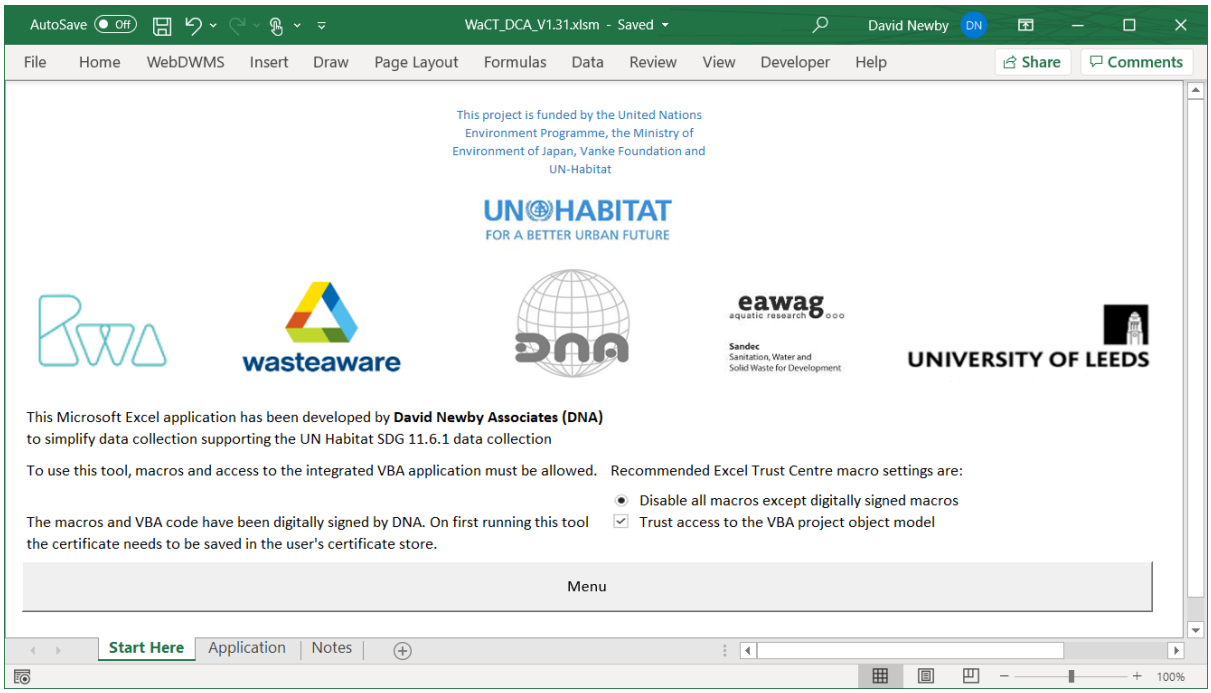
The WaCT spreadsheet application is used to enter data for your city in order to generate a number of Sustainable Development Goal (SDG) indicators. The WaCT spreadsheet tool handles the calculations necessary to generate some of these SDG indicators.

Data may be collected using paper forms, or (for some of the data) by downloadable forms that can be used on mobile devices (Android or IOS phones and tablets). Currently, collected data must be manually transferred into the spreadsheet.

Using the WaCT Spreadsheet Tool

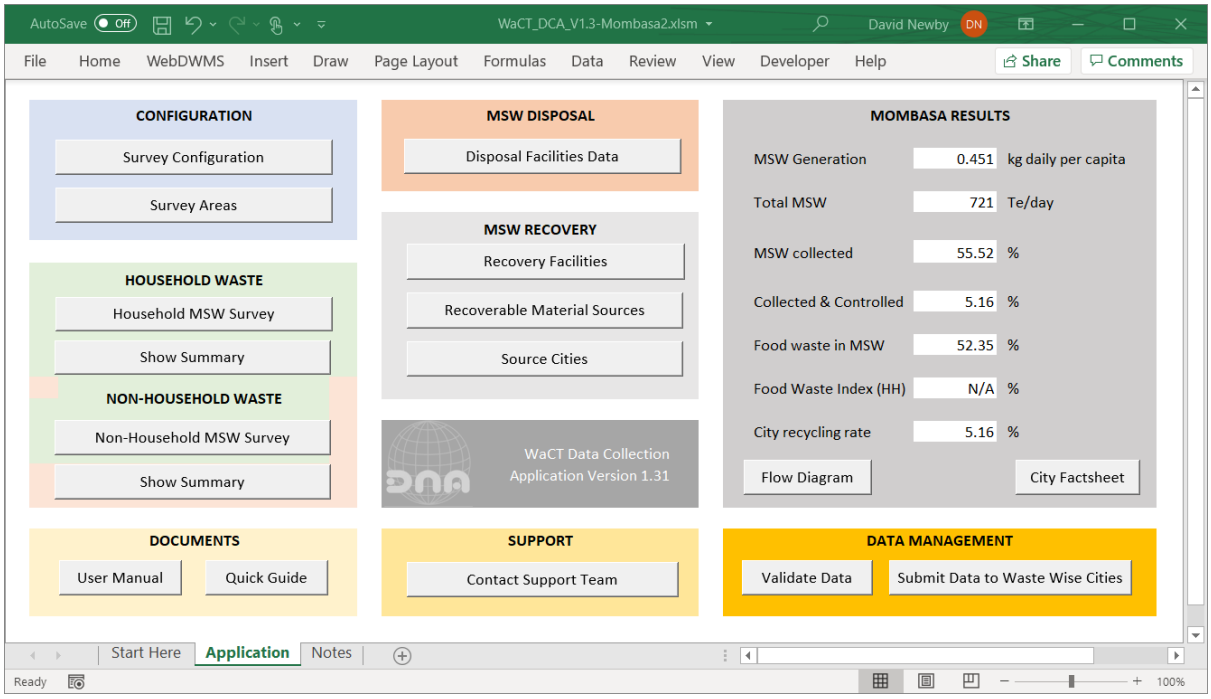
The tool is supplied in the form of a "macro enabled" Microsoft Excel Workbook (DNA-WaCT.xlsm).

When started, the spreadsheet tool will initially open to the introduction page:



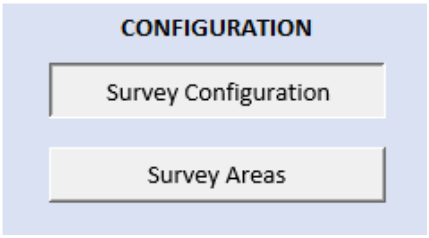
NB: To use this tool, macros and access to the VBA project must be enabled (instructions shown above).

After enabling the macros and VBA project, the tool functionality will be accessed solely from a single menu page - simply click on the "Menu" button on the start screen to go to the Menu page:



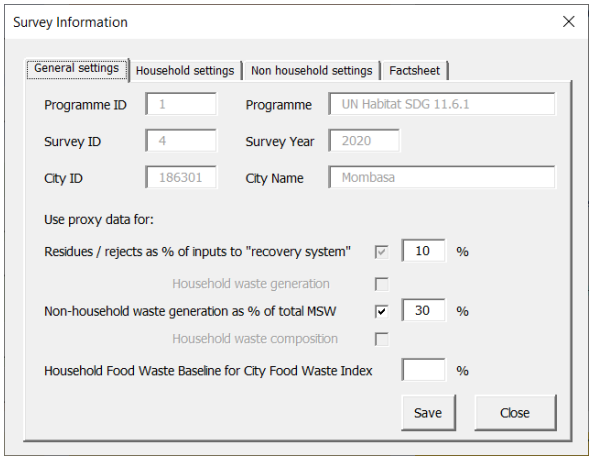
Clicking on any of the buttons will pop up the relevant data entry / data management form. The RESULTS panel is updated as data is entered.

STEP 1 - SURVEY CONFIGURATION



This form enables users to enter the basic information relating to the data collection activity. This includes identifying the city and the year to which the data relates and the population statistics by income level necessary for data extrapolation.

It also enables the user to determine the number of areas that will be covered by the survey (for each income level) and the number of households to be included for each survey area:



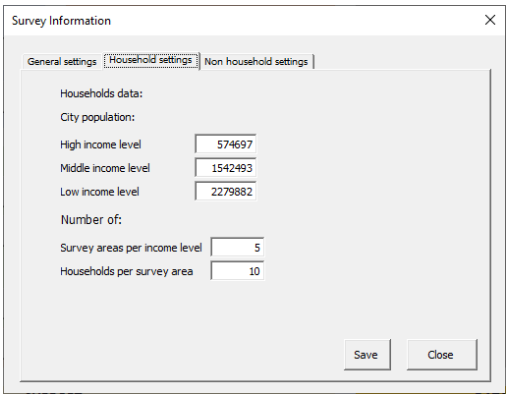
The initial step is to enter the survey year and city name.

The WaCT methodology uses a proxy figure for the percentage of rejects/residues from recovery/recycling processes. A checkbox is provided to use a proxy figure for % but this is disabled but a % figure can be entered and varied to determine "sensitivity" of this proxy figure.

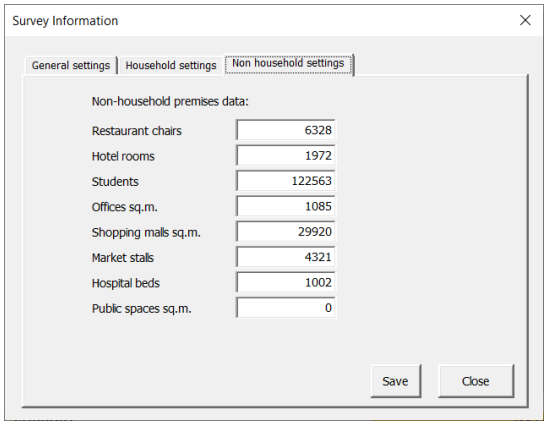
If available a baseline % figure for food waste can be entered.

A proxy figure can also be used for modelling the generation of municipal solid waste type wastes from non-household sources. If the checkbox is checked then this configurable proxy figure (which defaults to 30%) is used. If the box is unchecked then actual survey data is used. Again, the proxy percentage figure can be varied to determine the "sensitivity" of this value.

The “Household settings” tab is used to enter the survey parameters for the household waste survey including target number of areas to survey and the target number of households per survey area and the populations for high, middle and low income levels.



Tip: if you plan to survey fewer areas for a particular income level or fewer households for a particular area enter the lowest values here. The application checks that the minimum numbers have been created when checking validity of data for submission to the server.



The “Non household settings” tab is used to enter the data for the data for extrapolation of non-household MSW waste generation.

The Save button on each tab is clicked to save the entered data to the underlying worksheets.

At this point (if Excel is running on a Windows machine) the survey can be registered with the online UN Habitat SDG application by clicking the Register this survey button. If this is successful, the online application supplies a unique Survey ID and looks up the City ID (“geonameid”) for the named city. If successful this data is entered in the Excel application.

Once the city and year is registered online it cannot be changed.

The Close buttons close the open form, CAUTION any unsaved data will be lost.

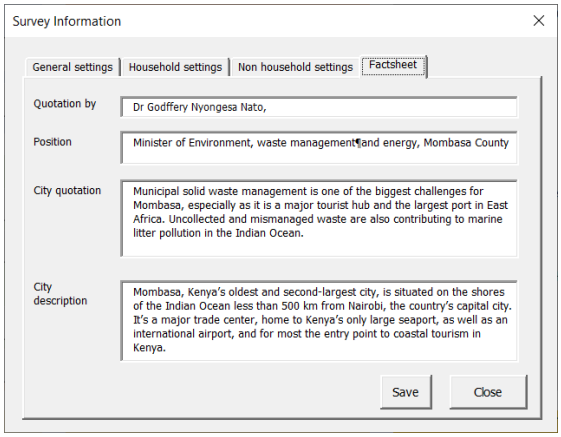
CAUTION: IF ANY DATA IS ENTERED IT IS TRANSFERRED TO THE UNDERLYING WORKSHEETS BUT THE EXCEL WORKBOOK MUST STILL BE SAVED ON EXIT OR ANY DATA ENTERED MAY BE LOST.

ALWAYS CLICK THE SAVE BUTTONS AFTER DATA HAS BEEN CHANGED UNLESS YOU WANT TO ABANDON THE ENTERED DATA

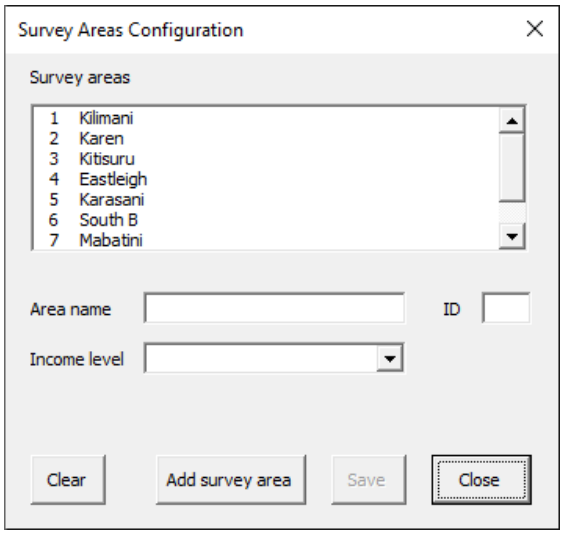
The WaCT DCA is capable of producing city factsheets. A Tab on the Survey Information data entry form allows the entry of a “forward “ by a city official and a city description.

The name of the city official and his/her job description can also be entered.

Pictures for the city official and for the city can be added when viewing the automatically generated city factsheet.



Configuration of survey areas where data collection activities are being undertaken is by use of a second form:

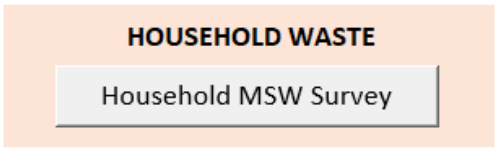


Survey area records are simply created by entering the Area name into the form, selecting the income level for the new area and then clicking the Add survey area button.

Values for any of the survey areas can be viewed by clicking on the entry in the survey areas list, updating the information and clicking the Save button.

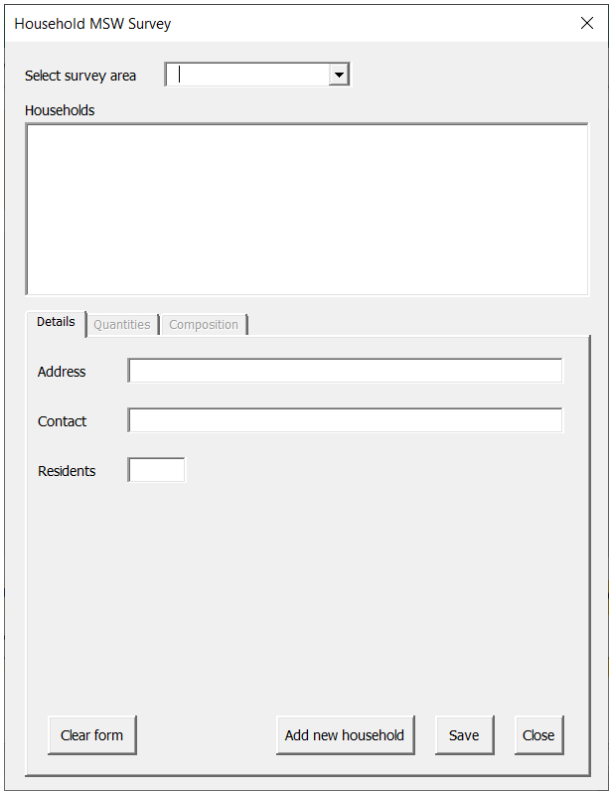
Data for a survey area can be changed, although this should not be necessary unless for example the name has been miss-spelt.

STEP 2 - HOUSEHOLD MSW SURVEY



Clicking on the Household MSW Survey button pops up a form to enter data for the household MSW survey:

This form has a drop down box at the top to select a survey area:



It has a listbox to show households in the selected area (if one is selected) and a "tabbed" data entry area.

The tabbed data entry area has three tabs:

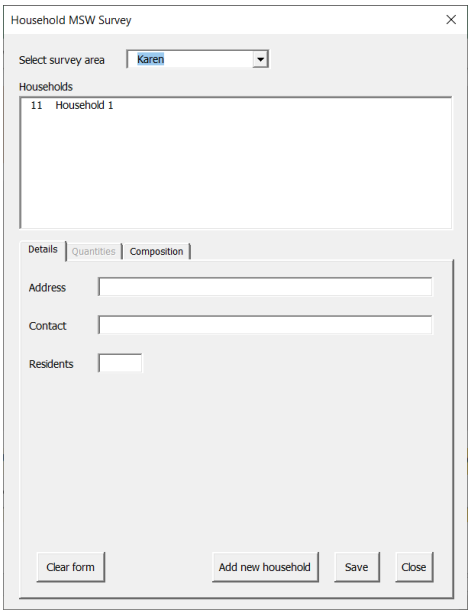
- "Details" for entering details for a selected household (a new household can also be added to the list for the selected area)
- "Quantities" for entering MSW generation quantities for a selected household (tab is only accessible if a household is selected in the list)
- "Composition" for entering MSW composition data for the selected area (tab is only accessible if a survey area is elected but no household has been selected)

The Clear form button can be used to clear the contents of the form before entering data for a new household to be added to the selected survey area.

Clicking the "Save" button saves any entered data. Clicking the Close button closes the form.

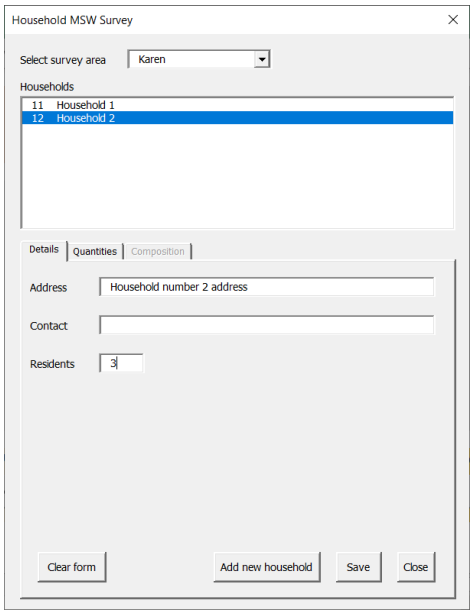
Caution: save data as necessary before closing the form

Adding a household



Firstly, select a survey area to add the household to (for example area "Karen").

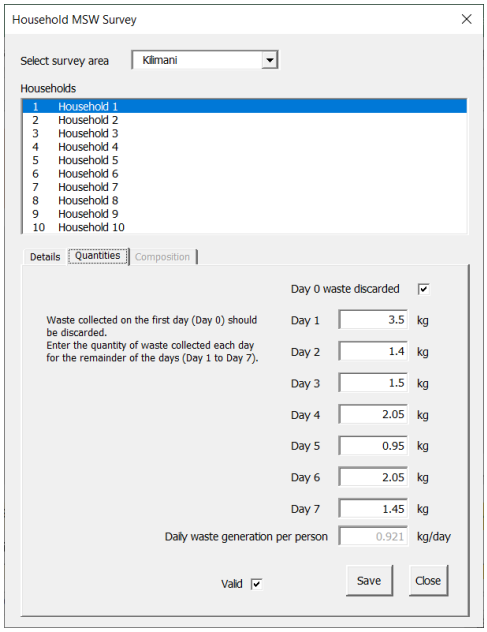
Enter the details for the household, for example "Household 2" (second household in area "Karen") then click on the button Add new household button, to add the entry.



Selecting "Household 2" in the list would enable the details for household 2 to be edited and saved.

The address and contact name are provided solely for use by a survey team to ensure that each day the correct household is visited to quantify the waste generation, it is never transferred out of the spreadsheet tool.

Entering MSW Generation Quantities



When a survey area and a household is selected, the "Quantities" tab is enabled and clicking on the tab shows the form for entering quantities data:

There is a checkbox for users to confirm that Day 0 waste has been collected to be discarded.

Each subsequent day the quantity collected can be entered.

Only numbers can be entered, a period (.) is used as the decimal separator.

Clicking the Save button transfers the data to the Households worksheet.

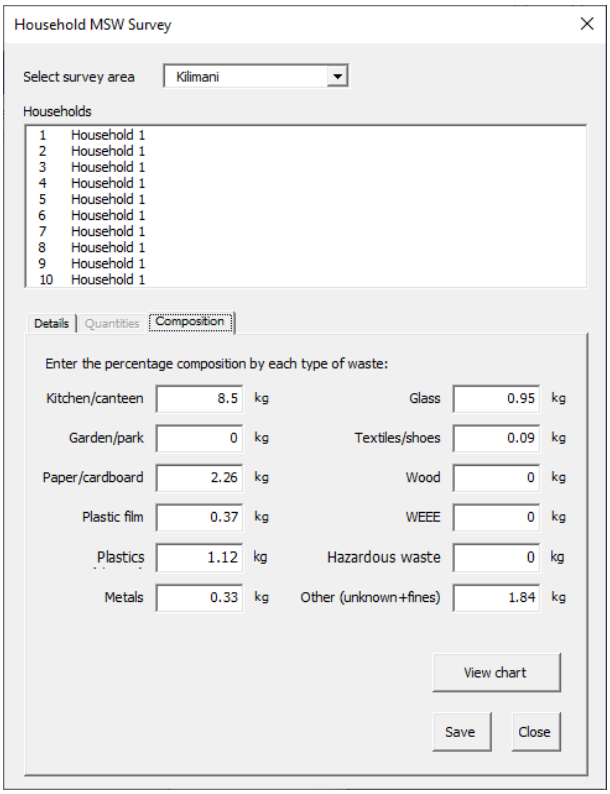
If a value (including "0") has been entered for each day, when this button is clicked, the application compares the generation per householder per day with proxy data held and warns the user if the value falls outside the range of 50% to 150% of the proxy value.

Once a value has been entered for each day, the "valid" checkbox is enabled. Data is not used for modelling city total MSW generation unless the data is marked as valid. To do this click the valid checkbox and save the data again. The validation check is skipped if the checkbox is ticked.

Clicking the Close button closes the data entry for, CAUTION: any unsaved data in the quantities form would be lost. The same applies if the user clicks on another household in the households list.

Entering MSW Composition Data

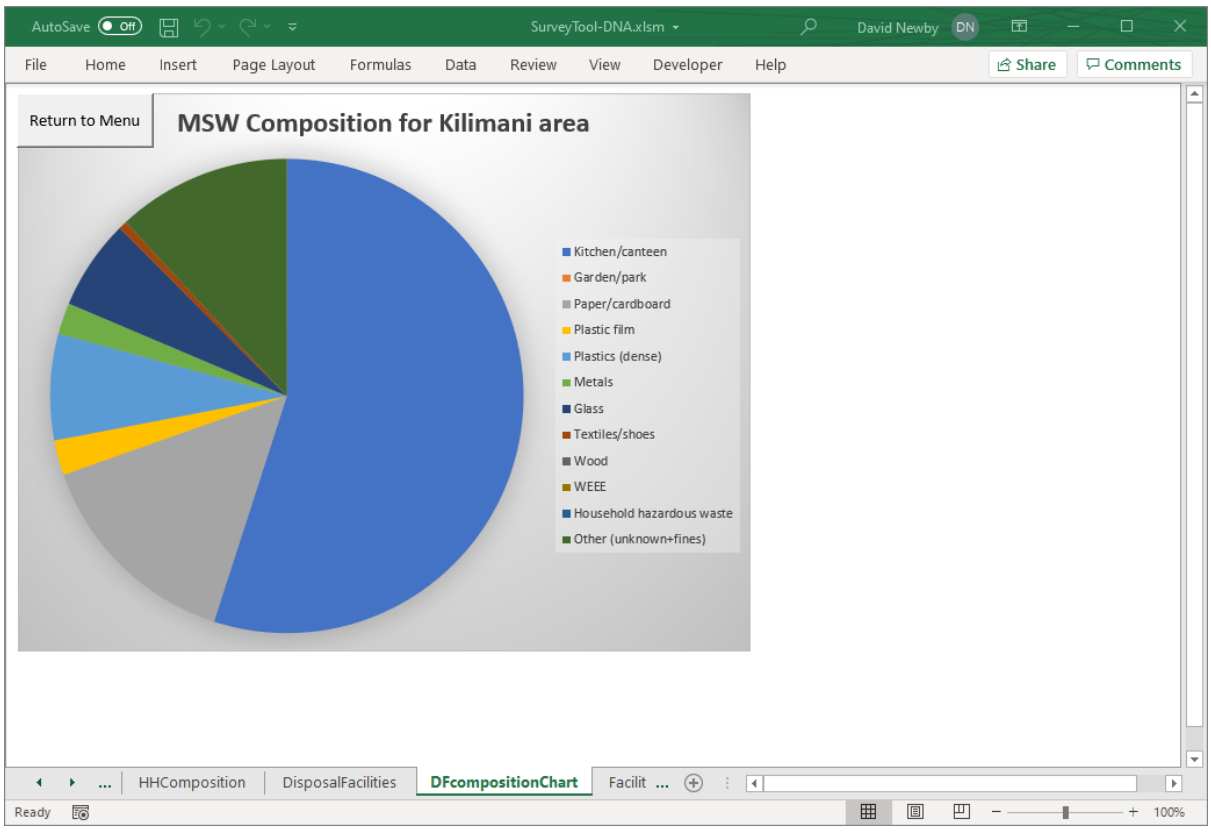
When a survey area is selected and a household has not been selected, the "Composition" tab is enabled and clicking on the tab shows the form for entering composition data:



Clicking the Save button transfers the data to the Households worksheet.

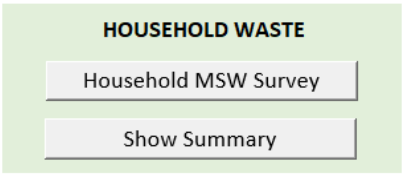
Clicking the Close button closes the data entry for, any unsaved data would be lost.

Clicking on the View chart button will close the pop up window and display the composition chart for the selected area:



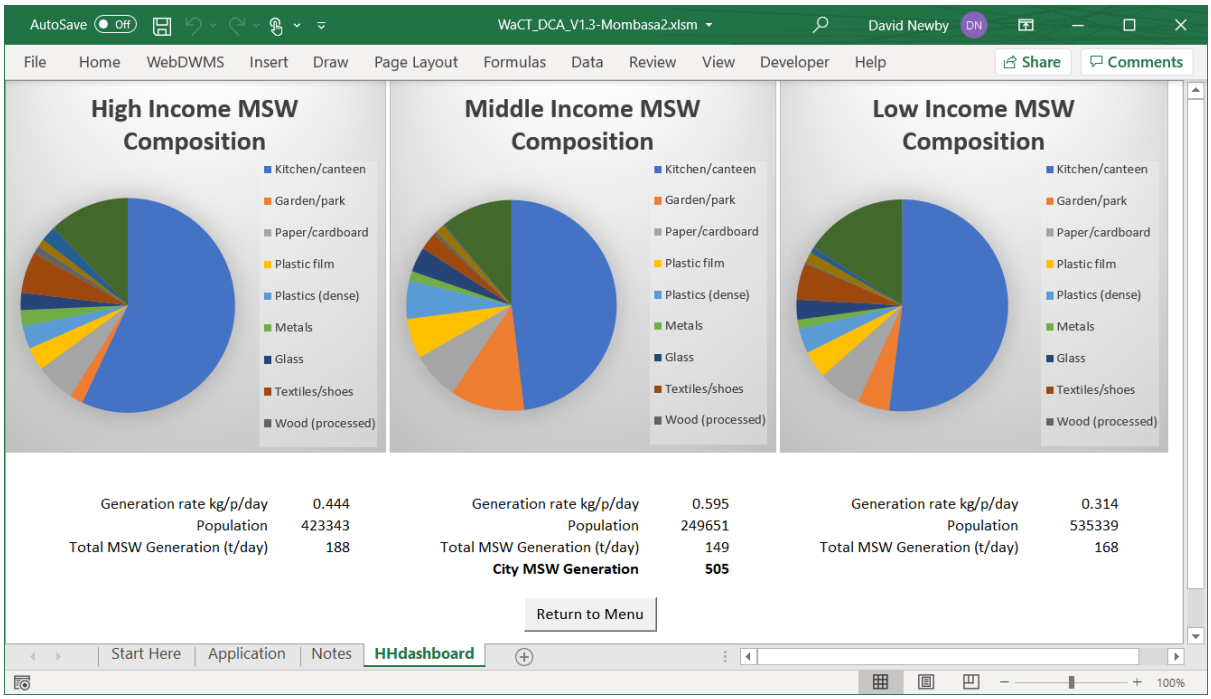
Clicking on the Return to menu button takes the user back to the main menu screen.

SHOW HOUSEHOLD SUMMARY



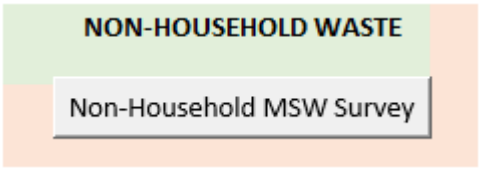
A summary dashboard for household waste generation and composition can be displayed by clicking on the

Show Summary button:

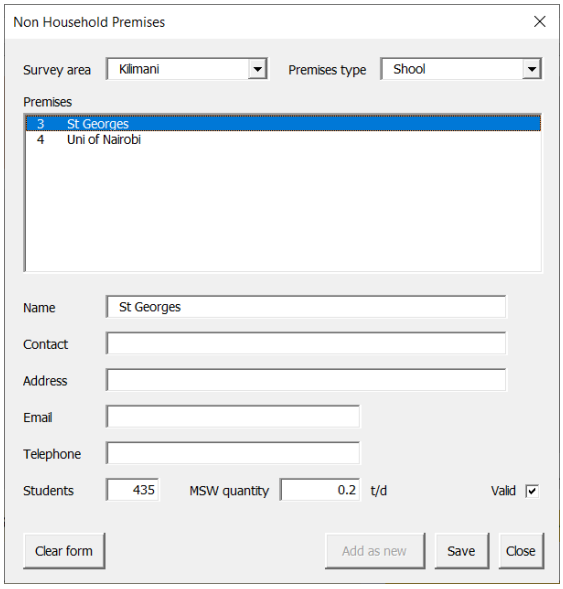


Click the Return to Menu button to return to the main menu.

STEP 3 - NON-HOUSEHOLD MSW SURVEY



Clicking the Non-Household MSW Survey button pops up a form to enable the user to enter details of surveyed non household premises. The first thing to do on this form is to select a survey area and premises type, the application then displays matching premises:



If a premises is selected then the data is displayed and can be edited and saved.

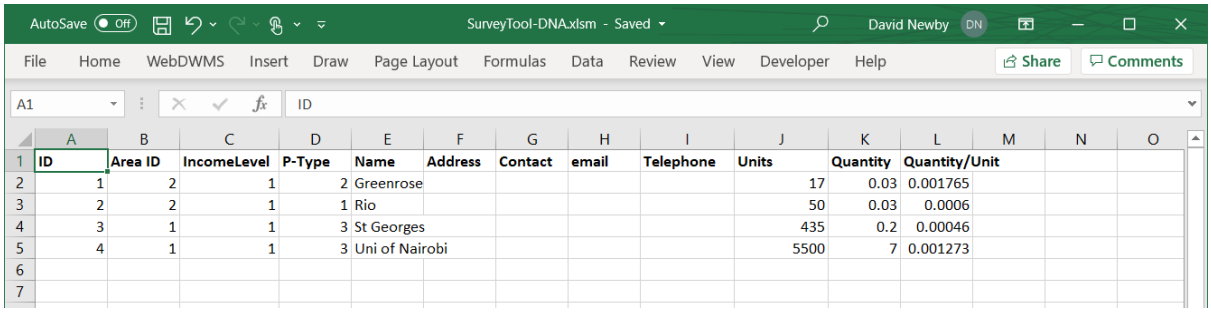
If no premises has been selected details can be entered for a new premises of the selected type in the selected area. Clicking the Save button saves the record.

The user can also click the Clear Form button when data is displayed to clear the form for entry of data for a new premises.

Records for different premises and different areas are entered and edited by selecting the relevant area and premises type in the drop-down lists and choosing a premises or entering details for new premises.

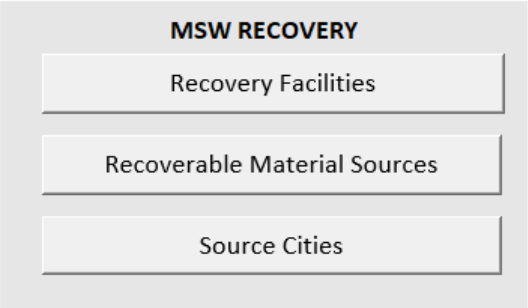
There is no limit on numbers of premises. The data is only used for modelling total city waste generation if the "Valid" checkbox is ticked when the record is saved. Validation is not automatic for non-household generated MSW.

Records are saved in the "NonHouseholds" worksheet:



ID	Area ID	IncomeLevel	P-Type	Name	Address	Contact	email	Telephone	Units	Quantity	Quantity/Unit
1	2	1	2	Greenrose					17	0.03	0.001765
2	2	1	1	Rio					50	0.03	0.0006
3	1	1	3	St Georges					435	0.2	0.00046
4	1	1	3	Uni of Nairobi					5500	7	0.001273

STEP 4 - MANAGE RECOVERY FACILITIES DATA



This set of buttons pop-up the necessary data entry forms for:

Entering data for recovery facilities

Entering data for sources from which recoverable materials are received.

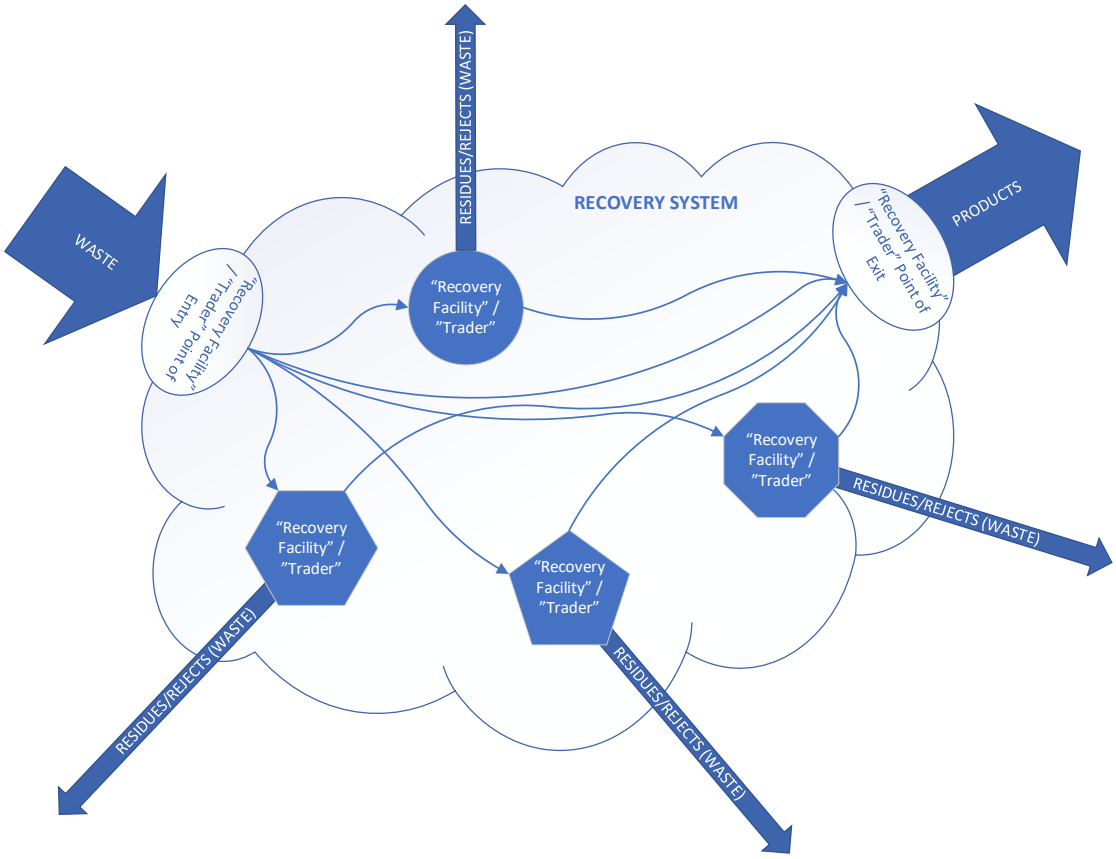
Entering data for cities from which recoverable materials are received.

Materials Recovery "System"

Understanding the Materials Recovery System is key to gathering useful data. Overall, a material recovery system in reality spans waste segregation at the point of waste generation all the way through to the point when the "products" of the overall materials recovery system are traded as no longer "waste". In cities with world class data reporting systems this data may be available, but where it doesn't exist, a data collection exercise needs to be determined which is practicable (technically and economically).

A key part of this is to define the "System" that will actually be "modelled" for the purposes of the WaCT.

The diagram below illustrates a "System" which can be modelled. This diagram illustrates the importance of identifying a point of entry to the modelled "Recovery System".



Wastes containing potentially recoverable materials enter the "system" and could have multiple "paths" through the system to the point where the input waste either leaves the system as a recovered product or as a waste (rejects / process residues).

In order to avoid double counting it is crucial to only count wastes as "Received" for materials recovery at the point of entry and identify the "Recovery Facility" it first goes to (to determine the level of control).

For SDG 11.6.1 we want to determine wastes "collected" for disposal and recovery, and whether they are taken to a "controlled" facility. For this we need the only need the two data points identified above quantity at point of entry and level of control of the facility it goes to along with the type of recoverable material and the source city. From this we need to subtract the wastes as these are received at "disposal facilities" (or dumped).

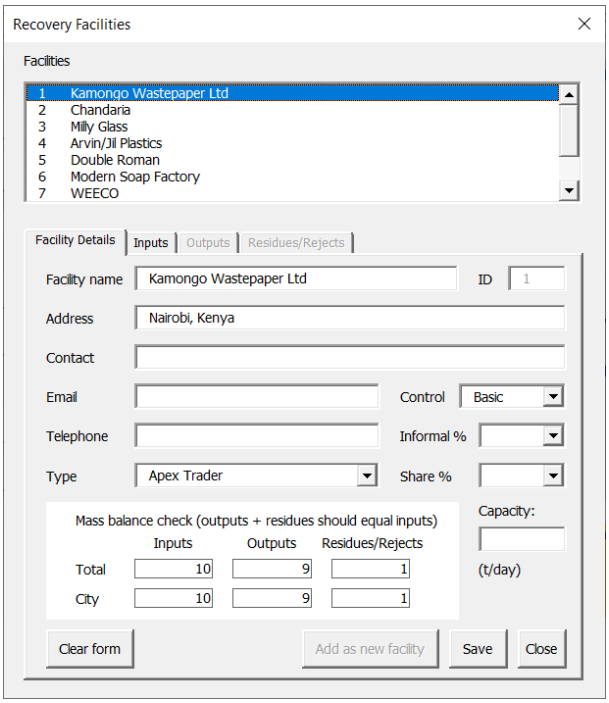
The actual pathway through the "system" is not relevant to SDG 11.6.1. However, we have two choices to determine the wastes from the system – EITHER try to collect data on waste generated by each of the facilities / traders within the system handling or processing the materials OR simply apply proxy value to waste inputs to the system. Experience in cities where WaCT has been applied would indicate that applying a proxy value is the best solution.

Finally, products of the overall materials recovery process may be determined in one of two ways, EITHER by identifying all "end-of-chain recyclers" and gathering data on their products, OR by mass balance concept PRODUCTS = INPUTS - RESIDUES/REJECTS.

The net inputs cannot be modelled unless all entities within the system are identified and their wastes quantified.

The decision has been made to focus on gathering the best data possible on inputs and applying a proxy value for rejects/residues and determine recovered material quantity as the difference between the two.

Recovery Facilities



The "Resource Recovery Facilities" form has four "tabbed" data input panels:

General information about the facility is entered on the "Facility Details" page.

This holds all details about the facility and presents a simple mass balance (material in vs material out) which can help in data validation.

Total inputs = inputs to the facility (wastes received).

Total outputs = outputs from the facility (products).

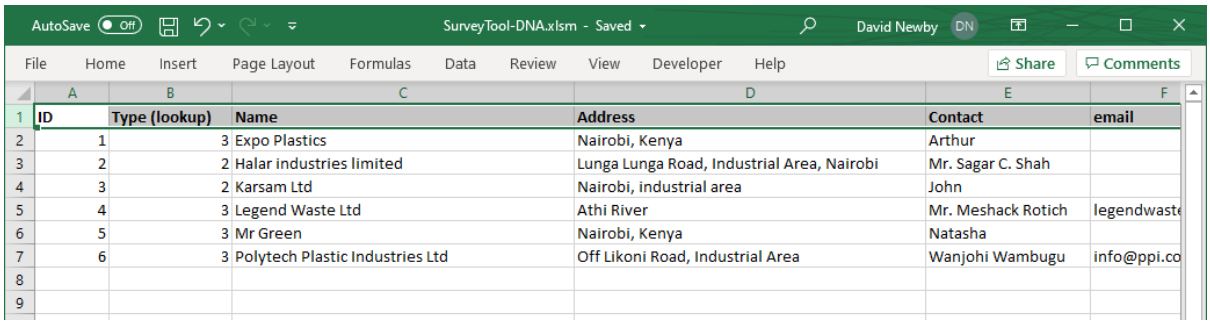
Total Rejects/Residuals = wastes from facility.

City inputs = amount of inputs counted as "received" into the recovery system from the survey city.

City outputs and residues/rejects are calculated pro-rata from city inputs.

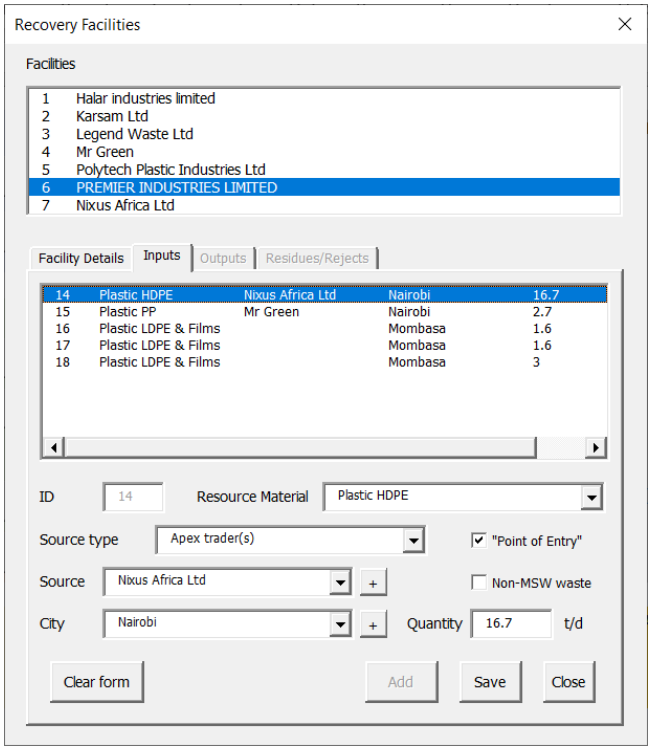
The Outputs tab and the Residues/Rejects tab are disabled when using proxy value for residues/rejects and percentage of inputs. In this case the mass balance display is simply calculated using the rejects / residues proxy value.

Data entered into the “Facility details” tab page is transferred to the “Facilities” worksheet:



ID	Type (lookup)	Name	Address	Contact	email
1	3	Expo Plastics	Nairobi, Kenya	Arthur	
2	2	Halar industries limited	Lunga Lunga Road, Industrial Area, Nairobi	Mr. Sagar C. Shah	
3	2	Karsam Ltd	Nairobi, industrial area	John	
4	3	Legend Waste Ltd	Athi River	Mr. Meshack Rotich	legendwaste
5	3	Mr Green	Nairobi, Kenya	Natasha	
6	3	Polytech Plastic Industries Ltd	Off Likoni Road, Industrial Area	Wanjohi Wambugu	info@ppi.co

Waste Inputs to Recovery Facilities



The “Inputs” tab enables all data on Recoverable Materials received to be entered.

Data is stored in the “RF_inputs” worksheet.

For any given recoverable waste type there may be multiple records associated with materials received from different source types, sources and different cities.

When the input form is opened the existing records of inputs to the Facility are listed, clicking on one of these in the list enables the record to be edited and saved. If no input is selected a new input record can be created by entering the new information and clicking the “Add” button.

If an input is selected, the form can be cleared by clicking on the “Clear form” button to enable new data to be entered.

It is crucial to modelling the SDG Indicators to ensure that the “Point of Entry” and “Non-MSW” check boxes are correctly set. Waste received is a “Point of Entry” waste received if it is received from any person, trader or facility that is NOT itself being included in the survey programme. If that person, trader or facility IS being included in the survey programme then “Point of Entry” is NO (N) and the data for material in question at “Point of Entry” should be collected for that person, trader or facility.

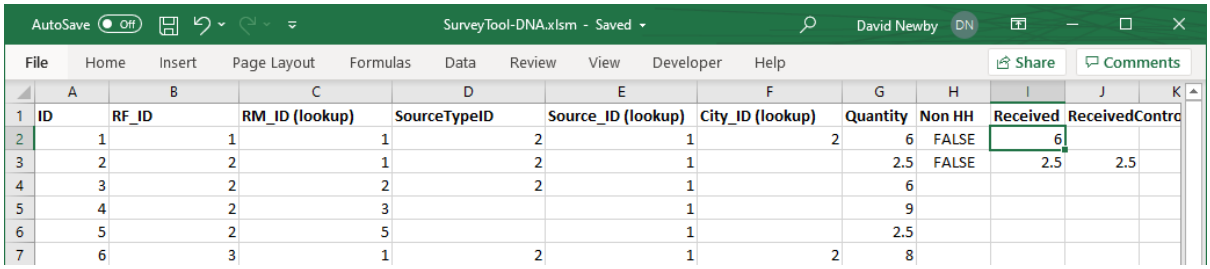
The Non-MSW box should be checked if the waste is not a household type waste (e.g. industrial or construction demolition waste).

The options in the Sources list depend on whether the source type is “Apex Trader” or “End-of-chain-recycler”. If so, the list displays recorded Resource Recovery Facilities; otherwise the list displays all entities from the “Sources” sheet.

If the source is not already listed in the sources drop-down list box then a record for a new trader **should** be added by clicking on the + button at the side of the list box. This will pop up a dialog box for the user to enter the name of the new trader. If a name is entered then a new Recovery Facility record is created. If the source type was “Apex Trader” or “End-of-chain-recycler” then a new record for that type of facility is added to the list enabling the new trader to be selected. Check the list carefully and be careful not to add duplicates!

A source city should be selected from the drop-down list. Again, if the required city is not in the list it can be added by clicking on the + button at the side of the list box – a box will pop up allowing the new city name to be entered.

Data entered into the Inputs tab is transferred to the “RF_inputs” worksheet:

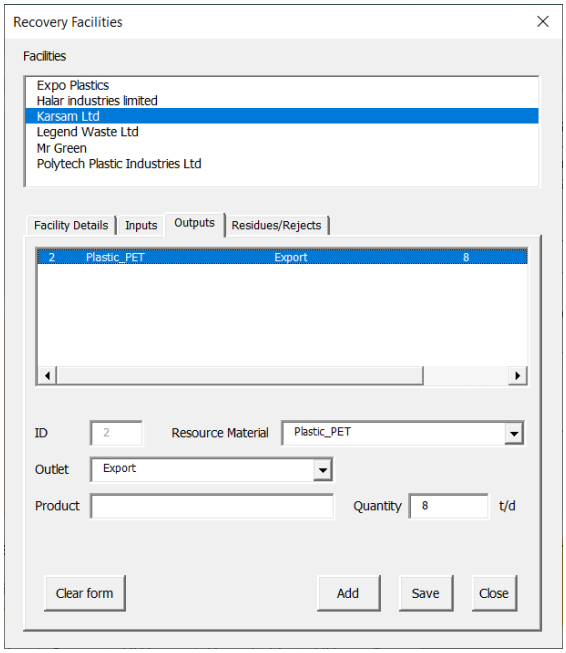


	A	B	C	D	E	F	G	H	I	J	K
1	ID	RF_ID	RM_ID (lookup)	SourceTypeID	Source_ID (lookup)	City_ID (lookup)	Quantity	Non HH	Received	ReceivedContro	
2	1	1	1	2	1	2	6	FALSE	6		
3	2	2	1	2	1		2.5	FALSE	2.5	2.5	
4	3	2	2	2	1		6				
5	4	2	3		1		9				
6	5	2	5		1		2.5				
7	6	3	1	2	1	2	8				

Outputs from Recovery Facilities

NOTE: This is not used when a proxy is being used for residues/rejects.

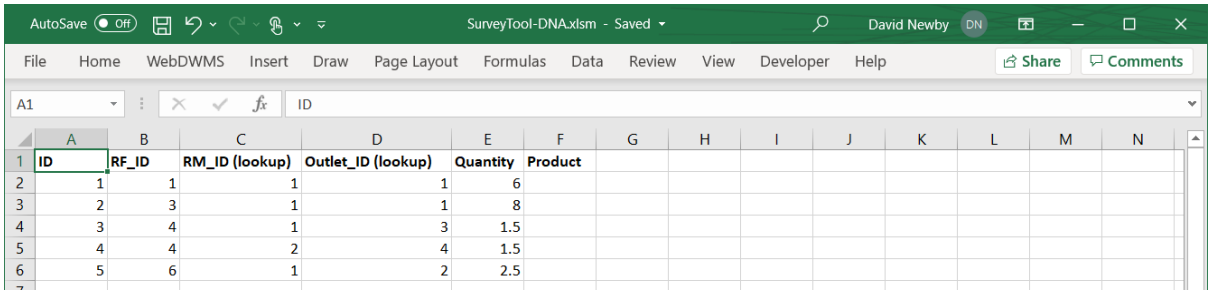
As with Inputs (potentially recoverable materials received, we gather data on products of the recovery processes. The recipients of the products are recorded in the “Outlets” data sheet.



Using the “Outputs” tab details of all outputs (Products) can be entered.

As with “Inputs”, If the outlet is not already listed in the sources drop-down list box then a record for a new outlet can be added by clicking on the + button at the side of the list box. Check the list carefully so as not to add duplicates.

Data is stored in the “RF_outputs” worksheet.



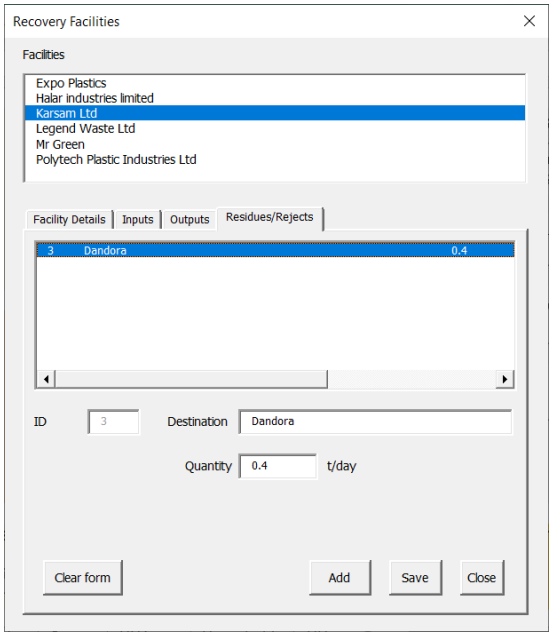
ID	RF_ID	RM_ID (lookup)	Outlet_ID (lookup)	Quantity	Product
1	1	1	1	6	
2	3	1	1	8	
3	4	1	3	1.5	
4	4	2	4	1.5	
5	6	1	2	2.5	

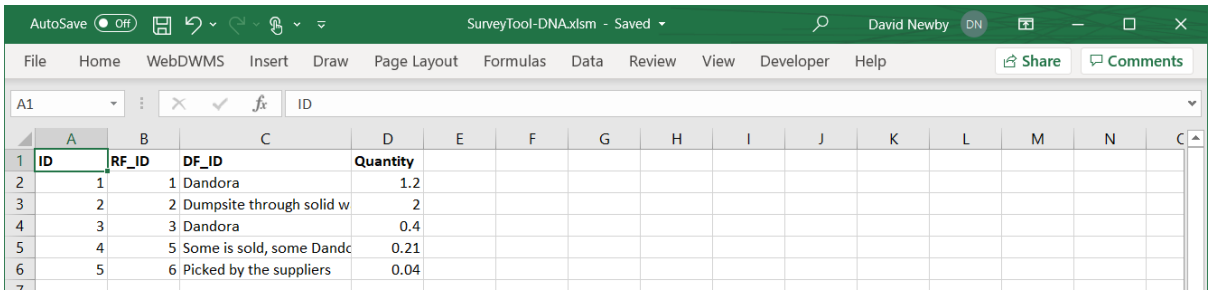
Residues/Rejects from Recovery Facilities

NOTE: This is not used when a proxy is being used for residues/rejects.

The "Residues/Rejects" tab is used to enter the details of residues/rejects (wastes) from the processes operated.

Data is stored in the "RF_wastes" worksheet.





ID	RF_ID	DF_ID	Quantity
1	1	Dandora	1.2
2	2	Dumpsite through solid w	2
3	3	Dandora	0.4
4	5	Some is sold, some Dandc	0.21
5	6	Picked by the suppliers	0.04

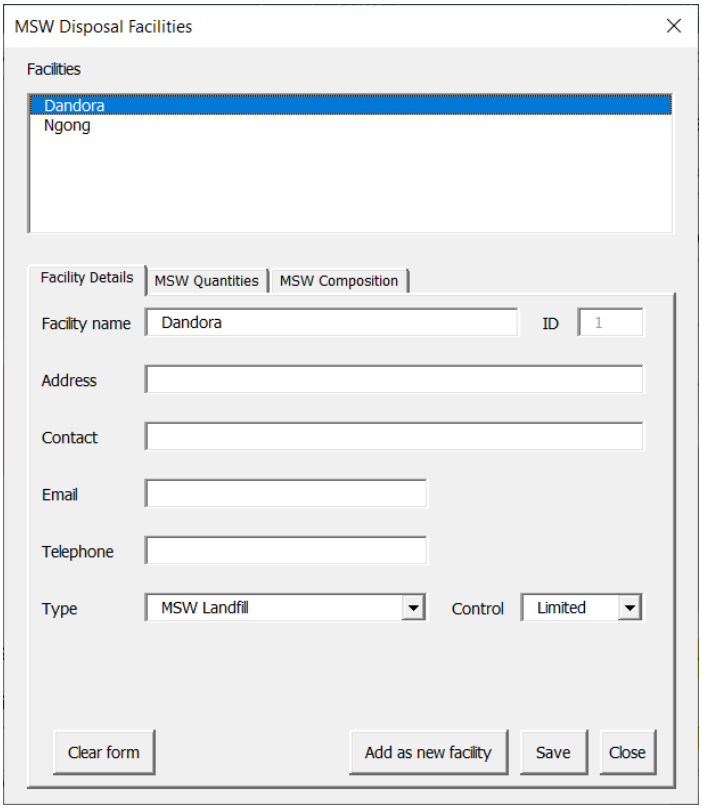
STEP 5 - MANAGE DISPOSAL FACILITIES DATA

Click on the manage disposal facilities button pops up a data entry form allowing records to be created (and edited) for MSW Disposal Facilities, and enables users to enter data for MSW received (quantities and composition).

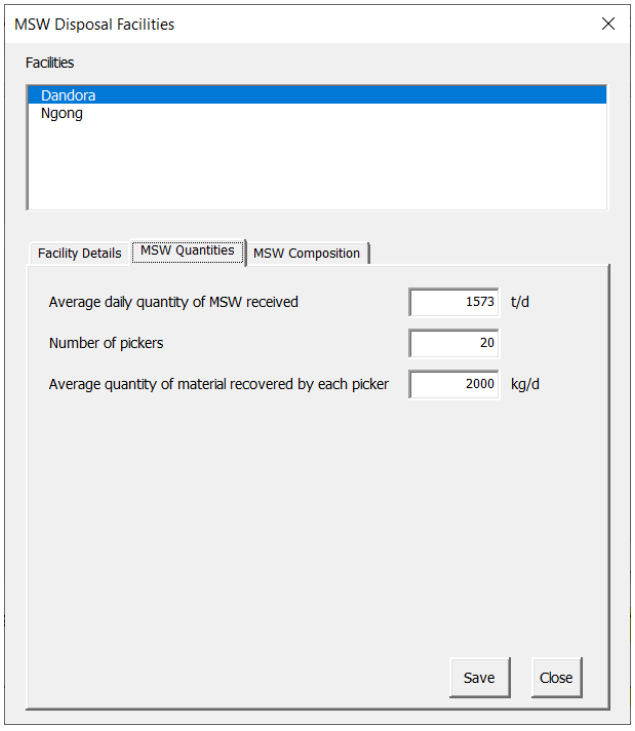
Initially, a list of disposal facilities is displayed, if none have been entered this is blank.

In addition to the disposal facilities list, this form has three “tabbed” data entry areas:

- Facility details: enables new records to be created for MSW disposal facilities, or edited (clicking on a facility name in the list displays the details for the selected facility). Edited data can be saved by clicking on the “Save” button.
- If viewing data for a facility, the displayed data on the form can be cleared, enabling data to be entered for a new disposal facility record. A new record can be saved by clicking on the “Add as new facility” button.
- The “Close” button simply closes the pop-up form (any unsaved data may be lost).

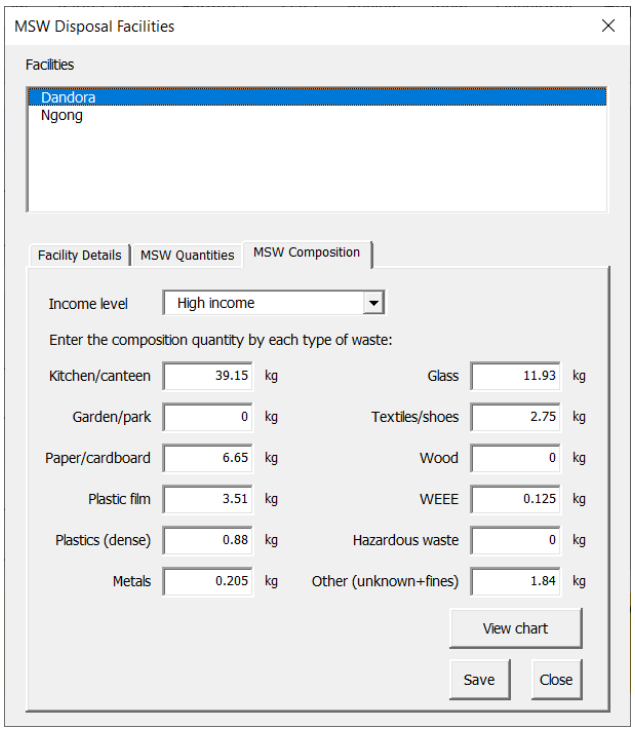


The other two tabs “MSW quantities” and “MSW composition” allow that data to be entered and edited:



On each form, clicking the Save button will save entered data; Close button closes the form.

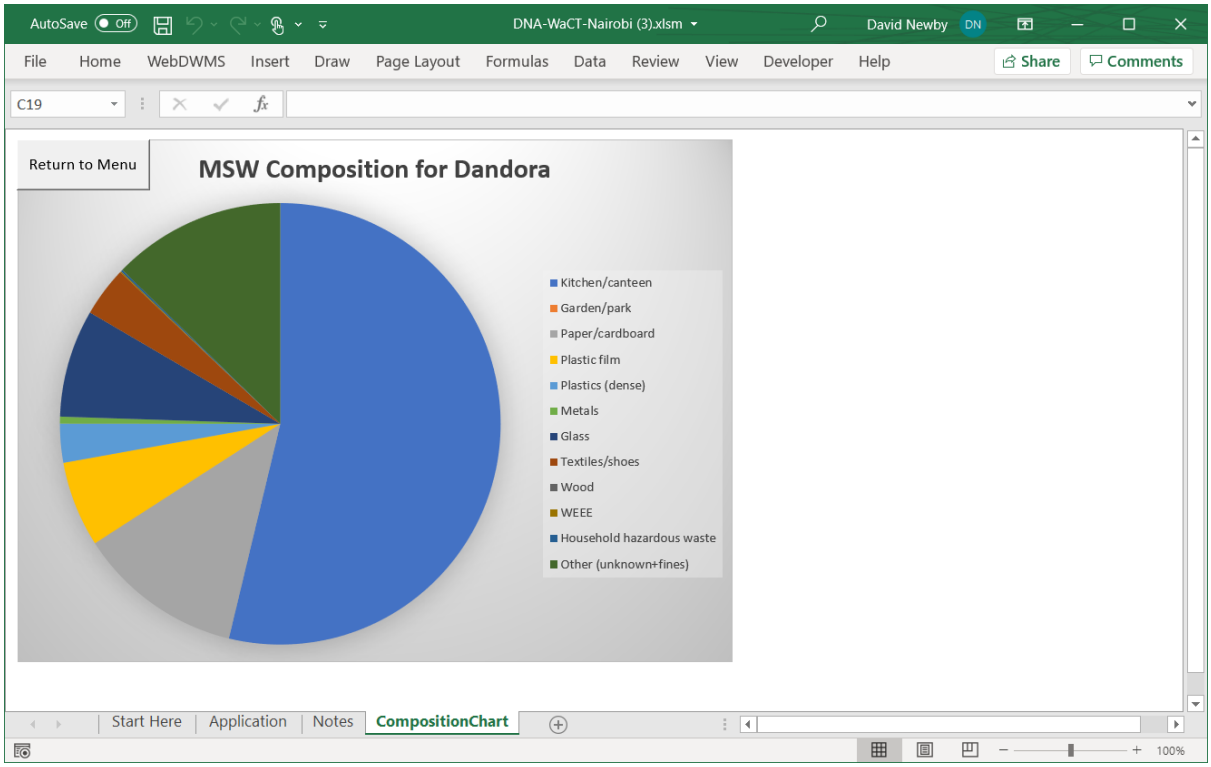
STEP 6 – MANAGE COMPOSITION DATA FOR WASTE DISPOSAL FACILITIES



Composition data can be entered for 3 samples at any of the waste disposal facilities reflecting samples for waste from each income level.

Click the Save button will save entered data; Close button closes the form.

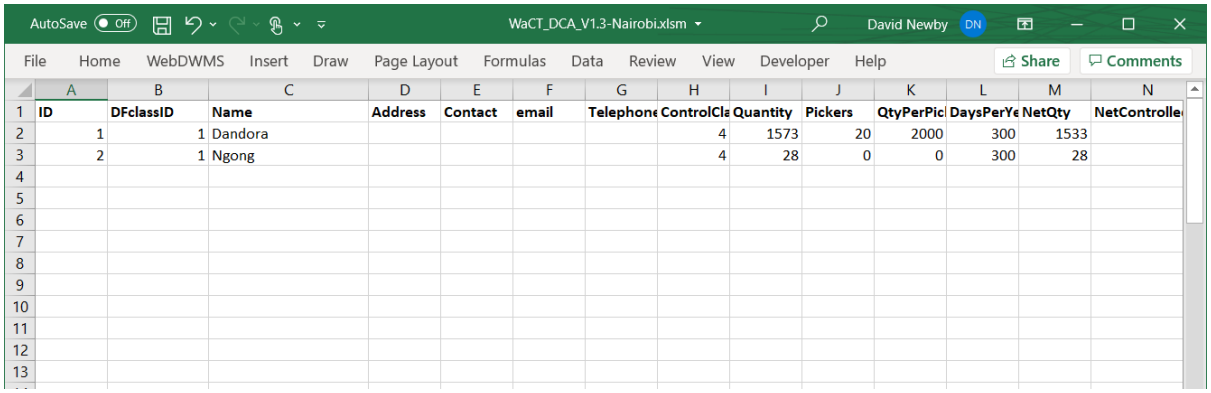
Clicking on the "View chart" button will, if composition data has been entered and saved, take the user to the composition chart for the selected disposal facility showing average composition:



Click on the "Return to Menu" button to go back to the main Menu page.

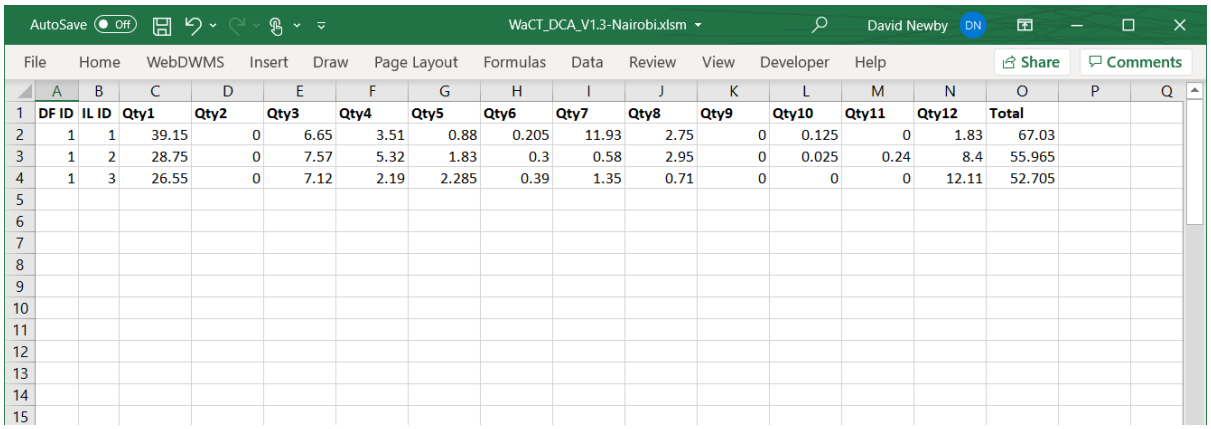
Entered data in each form is transferred to the appropriate worksheet.

SO, the facility details data entered in the above form is saved in the underlying "DisposalFacilities" worksheet, along with the necessary formulae for needed calculations:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	ID	DFclassID	Name	Address	Contact	email	Telephone	ControlCla	Quantity	Pickers	QtyPerPic	DaysPerYe	NetQty	NetControlle
2	1	1	Dandora					4	1573	20	2000	300	1533	
3	2	1	Ngong					4	28	0	0	300	28	

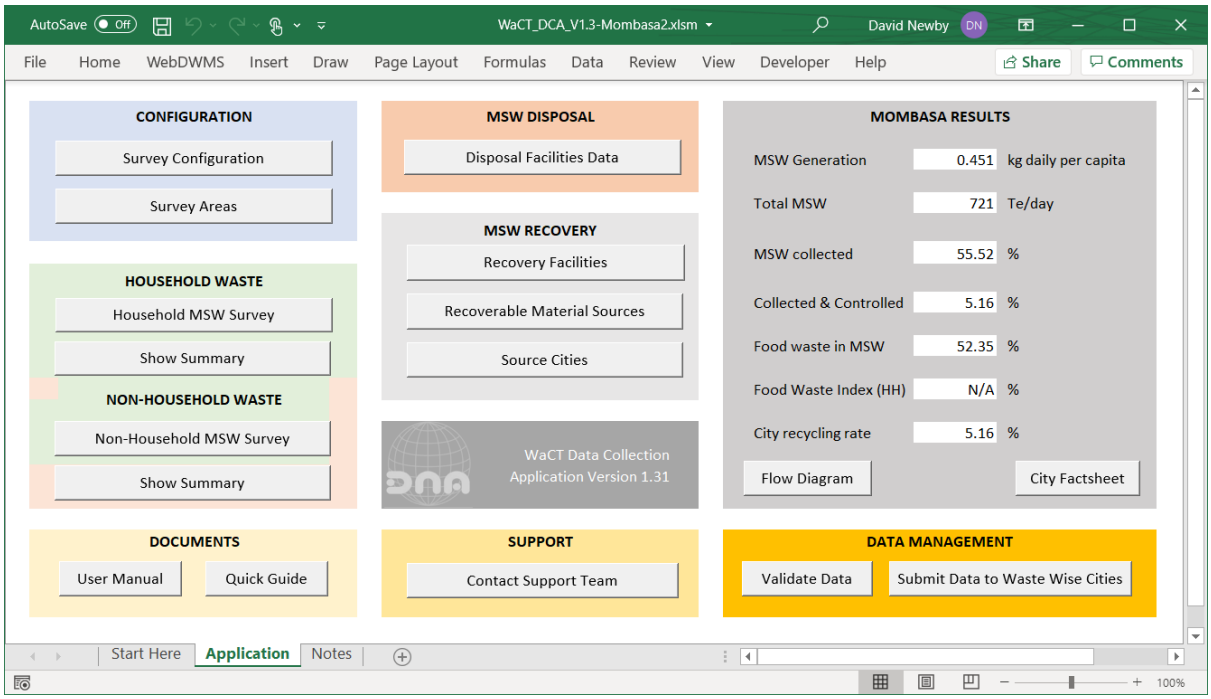
As can be seen above Quantities data is also automatically transferred to the DisposalFacilities worksheet. Similarly Composition data is also transferred into the DisposalFacilities worksheet:



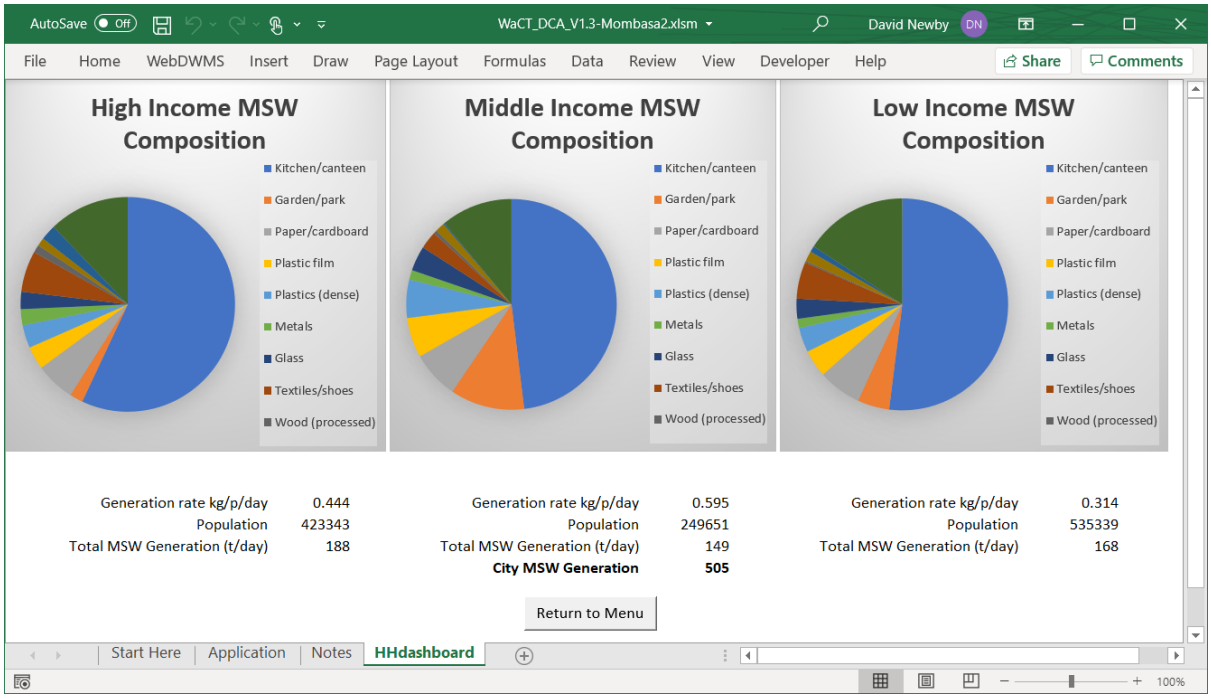
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	DF ID	IL ID	Qty1	Qty2	Qty3	Qty4	Qty5	Qty6	Qty7	Qty8	Qty9	Qty10	Qty11	Qty12	Total		
2	1	1	39.15	0	6.65	3.51	0.88	0.205	11.93	2.75	0	0.125	0	1.83	67.03		
3	1	2	28.75	0	7.57	5.32	1.83	0.3	0.58	2.95	0	0.025	0.24	8.4	55.965		
4	1	3	26.55	0	7.12	2.19	2.285	0.39	1.35	0.71	0	0	0	12.11	52.705		

DISPLAYING RESULTS

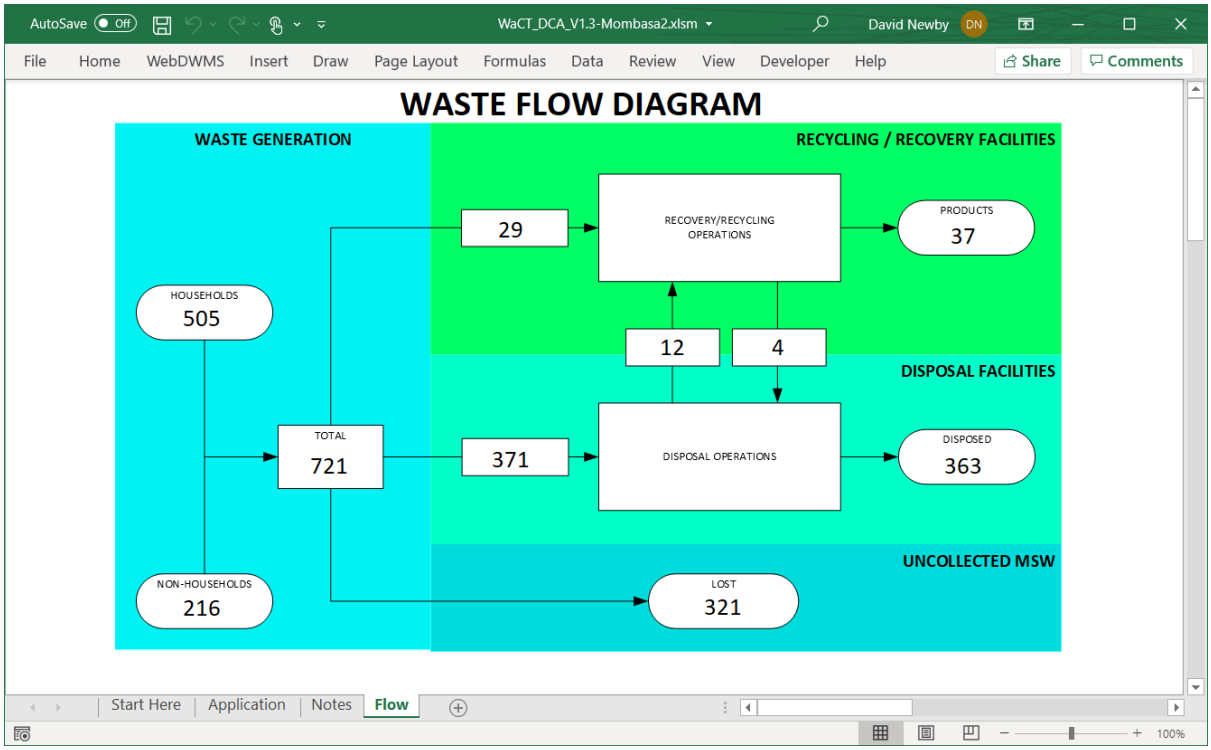
As data is entered into the Application, the results are updated in the RESULTS panel:



A summary of the household wastes data can be displayed by clicking on the Show Summary button in the HOUSEHOLD WASTE panel:

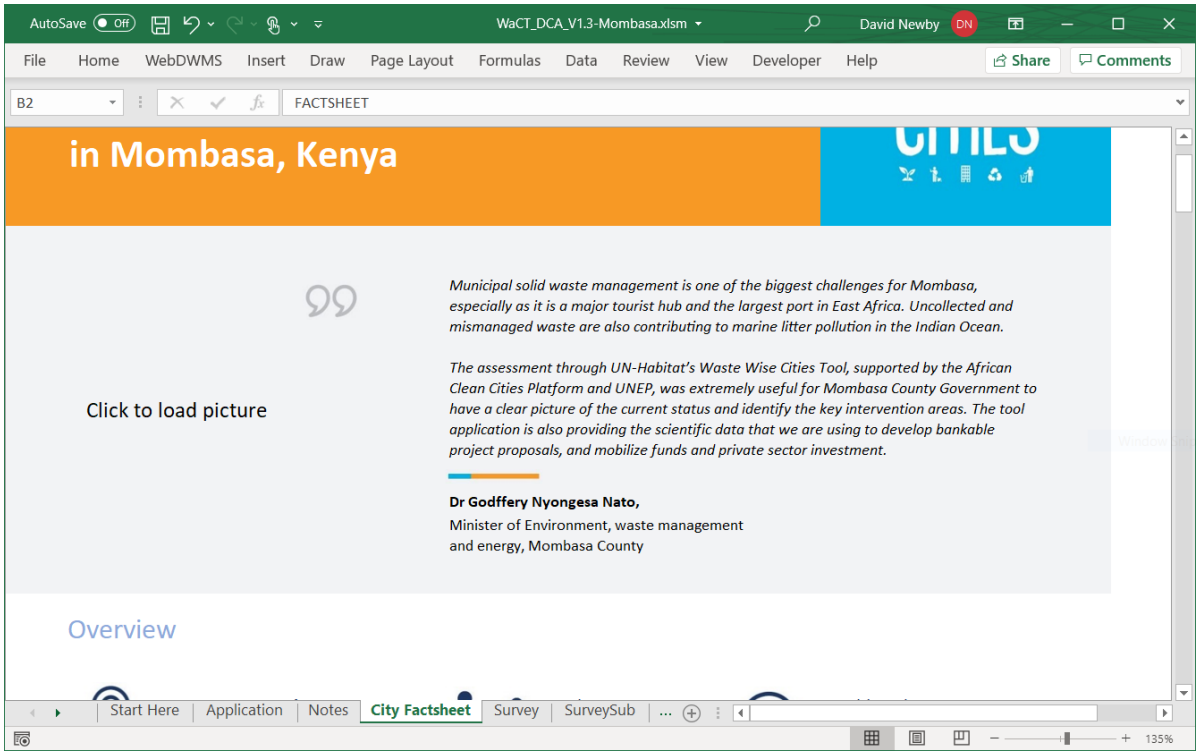


A flow diagram can be displayed by clicking on the Flow Diagram button:

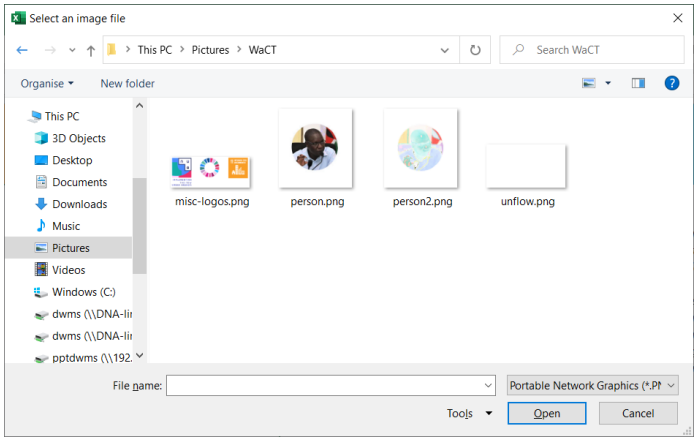


The City Factsheet

The WaCT DCA automatically generates a City Factsheet:



Pictures can be added in this Factsheet by clicking on the cells where pictures can be inserted, a popup dialog box appears to select a picture:



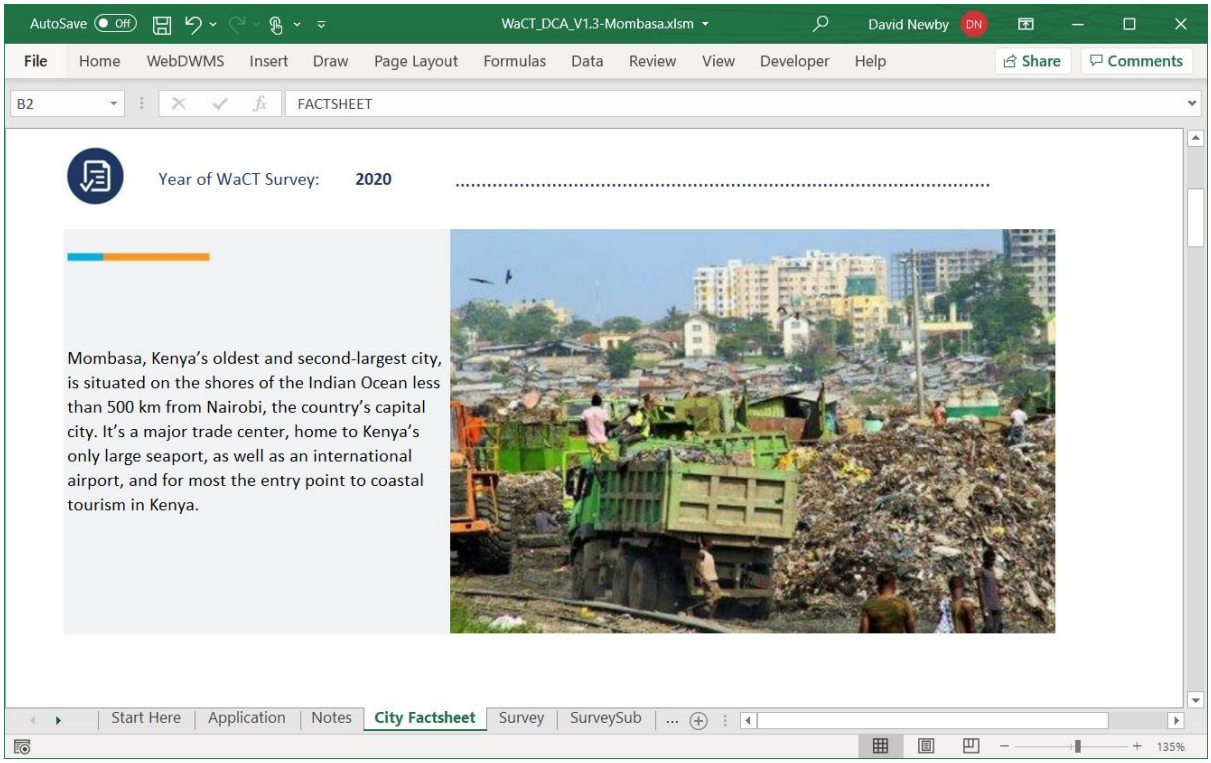
When a picture is selected, it is inserted into the Factsheet.

The pictures should be sized approximately as follows:

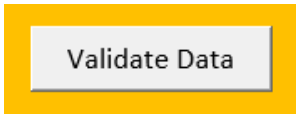
Picture accompanying the "Forward", would normally be a picture of the person making the introduction, this should be 380 pixels wide by 410 pixels high. The picture can be larger but should be a similar aspect ratio to this.

When a picture is selected it is inserted and automatically resized to fit the area in the Factsheet:

The picture associated with the city description should be approximately 1055 pixels by 700 pixels; it may be larger but should always be a similar aspect ratio:

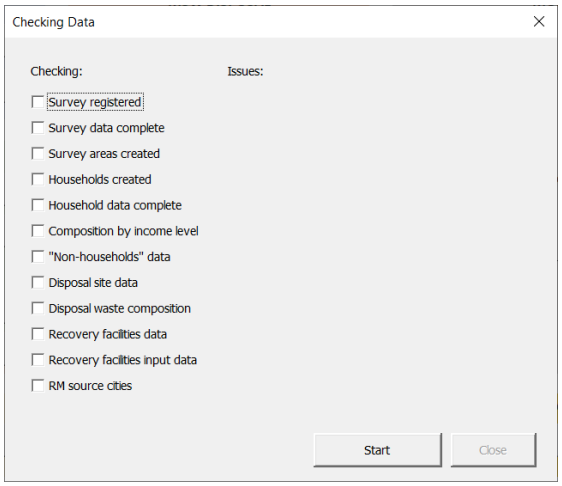


VALIDATING RESULTS



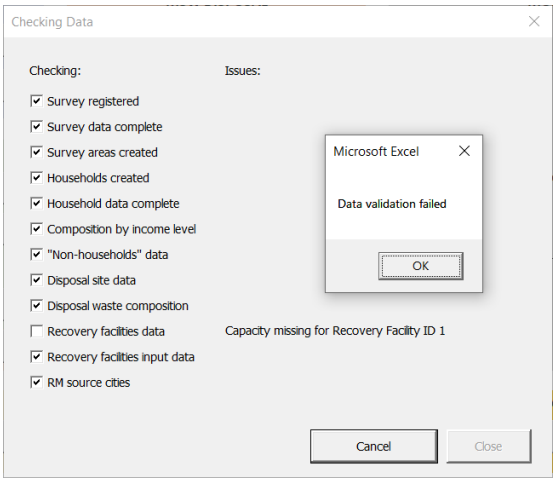
The application does basic validation of household waste generation quantities at the time of data entry. Before data may be uploaded to the online data server it is further validated to ensure it is complete.

To check the data click on the Validate Data button to pop up the data validation form:



To start validation click on the Start button.

The application checks all of the data sheets to check that the data required is complete, if any data is missing then the application displays the relevant result:

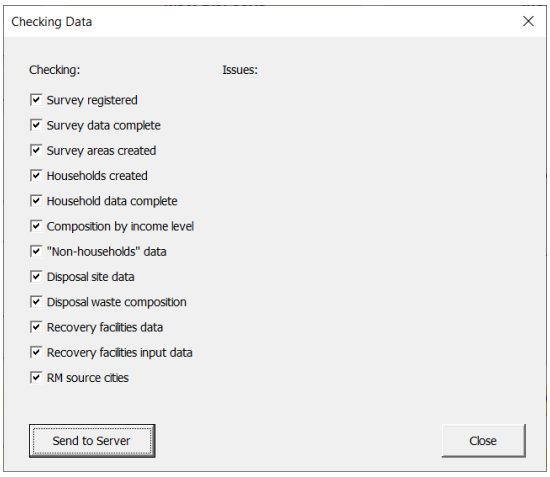


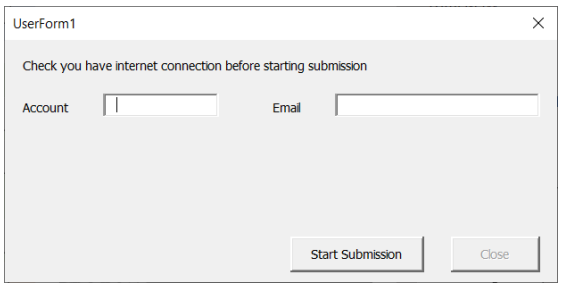
Enabling the user to enter the missing data and retry validation.

UPLOADING DATA TO THE DATA SERVER

Data can be uploaded to the WaCT data server by clicking this button. Prior to attempting to upload the data, the application revalidates the data. If the data validates successfully a Send to server button is enabled.

Clicking that button pops up another form to initiate the submission process.





To submit the data it is necessary to enter an Account code and an email address.

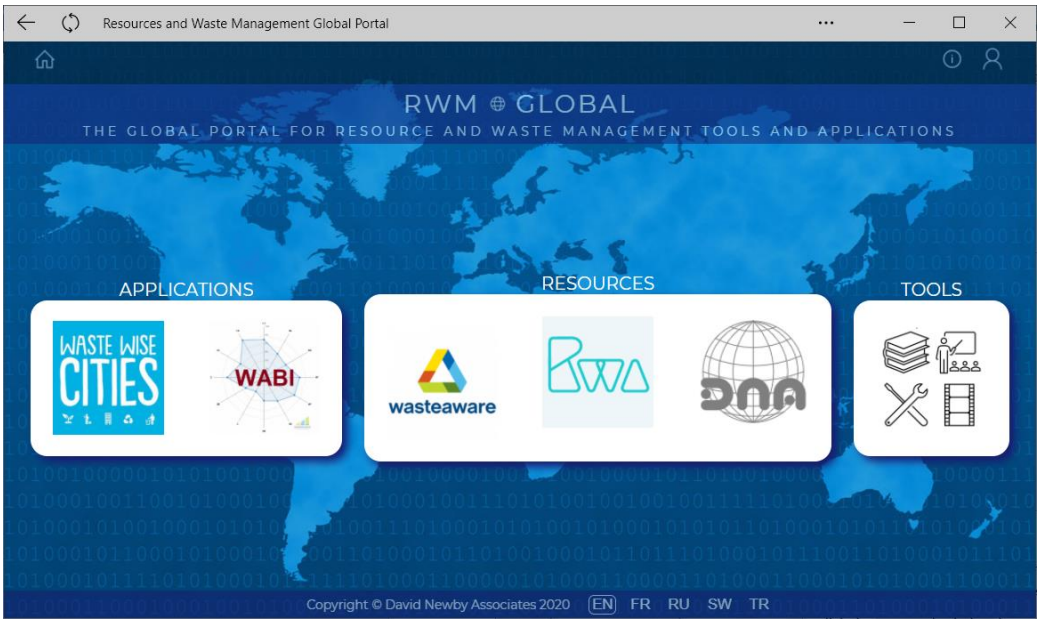
Click the Start Submission button to start sending the data to the server.

The application then generates data files to submit to the server and then sends them.

Progress is displayed and the application will indicate success or failure.

OBTAINING CREDENTIALS FOR UPLOAD

In order to upload to the WasteWise Cities database users require an Account code and user name. To obtain credentials go to the RWM.Global server (https://rwm.global) and choose the WasteWise Cities application:



The WasteWise Cities application on the RWM.Global enables organisations to register and add users.

Notes on the WaCT data modelling

Household Wastes

Household generation rates are averaged by income level and used to calculate the total waste generation for each income level using the population data. Only data flagged as "Valid" is used in these calculations.

When calculating the generation rates for income levels the application sums the average daily waste generation for each for each valid household record for that income level and divides this by the total residents for each valid household record for that income level.

Non-Household Wastes

Non-Household generation rates are averaged for each type of non-household premises and used to calculate the total waste generation for each type of premises. Only data flagged as "Valid" is used in these calculations.

The application gives the option of using a proxy percentage to estimate non-household waste generation based on the modelled household waste generation.

Disposal Facilities

Data on MSW quantities received (along with quantities "received" at recycling facilities) is used to calculate the % of MSW waste generated that is received at waste management facilities. The model also calculates quantities of waste received at "controlled" facilities by using the control level data and counts waste received at facilities which have a control level of "basic" or better.

Recovery Facilities

Inputs into a Recovery Facility are counted in total inputs only if the records are flagged as "Point of entry" records.

They are counted as "Received" (City Inputs) for the purposes of the SDG indicators if flagged as "Point of entry" records AND the source city is the survey city.

They are counted as "Received" at "Controlled" facilities if the control level of the facility is recorded as "Basic" or better.

The WaCT methodology uses a proxy value to estimate net recovery/recycling by assuming a fixed percentage for rejects/residues. This proxy value is user configurable.

The **recycling rate for the city** = City Outputs as a percentage of total MSW generated.

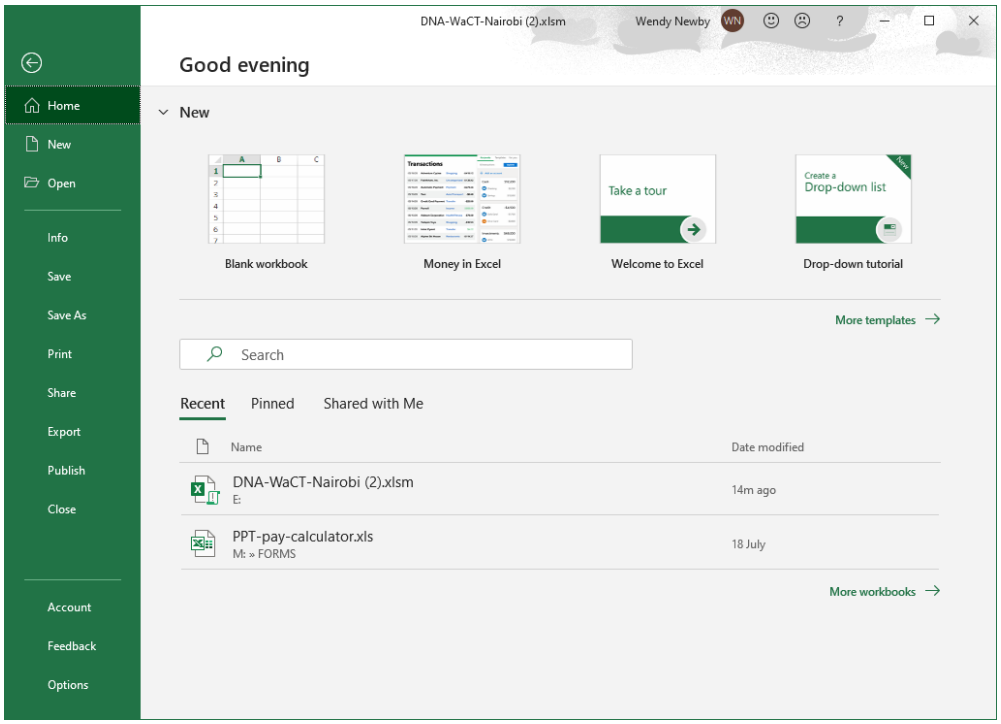
ANNEX 1 - Excel Applications Security

WaCT and Excel Security

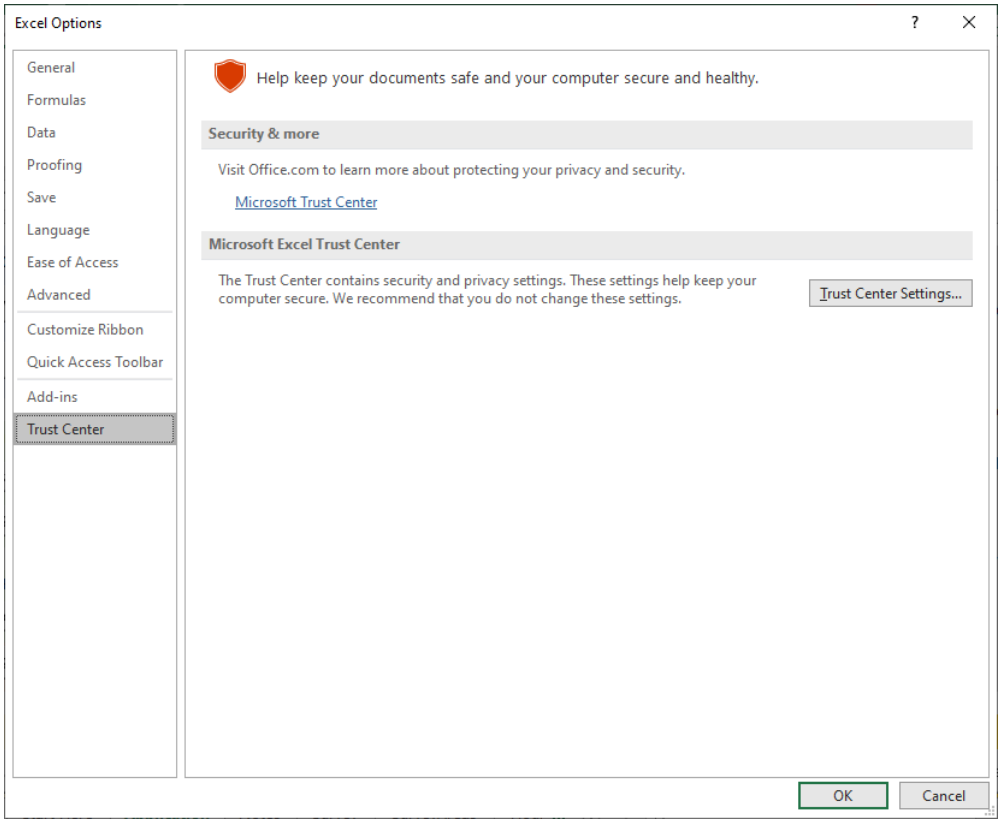
The WaCT spreadsheet application contains a full MS Office VBA application and a suite of Macros. To the use the tool, Excel must be configured to allow the use of Macros and the VBA application.

Step 1 Configure Settings In The Trust Centre

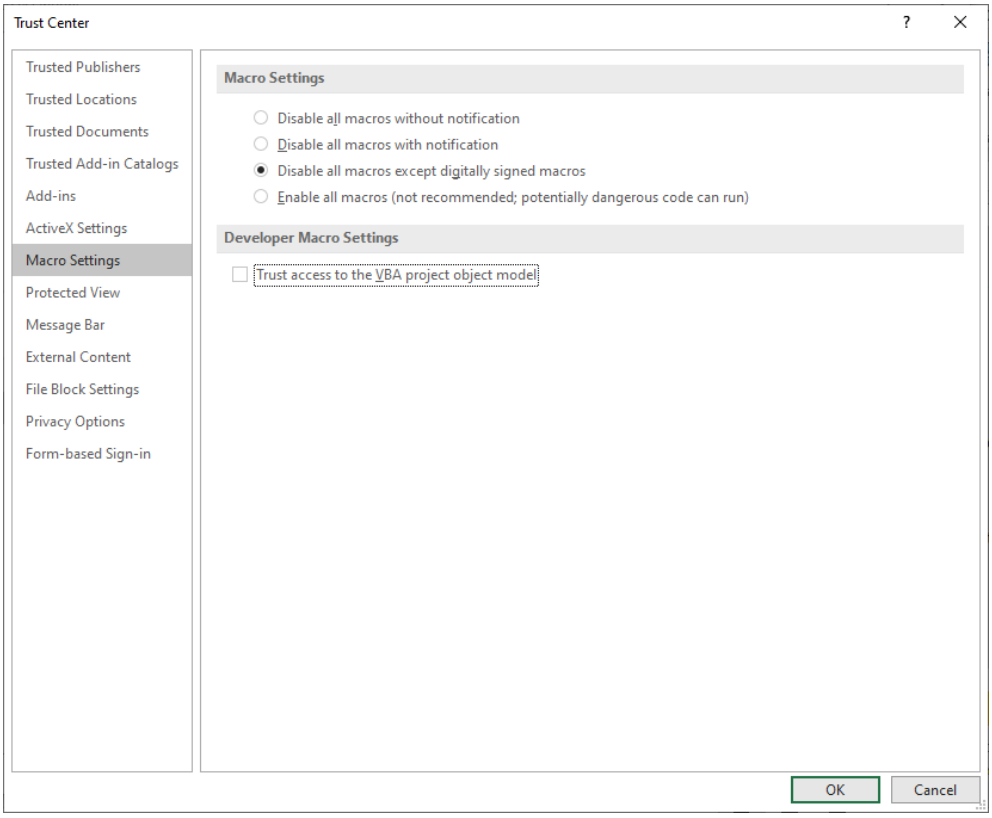
Open Excel and click on File in the menu:



Choose Options and click on Trust Centre :



Then click on Trust Center Settings.. :

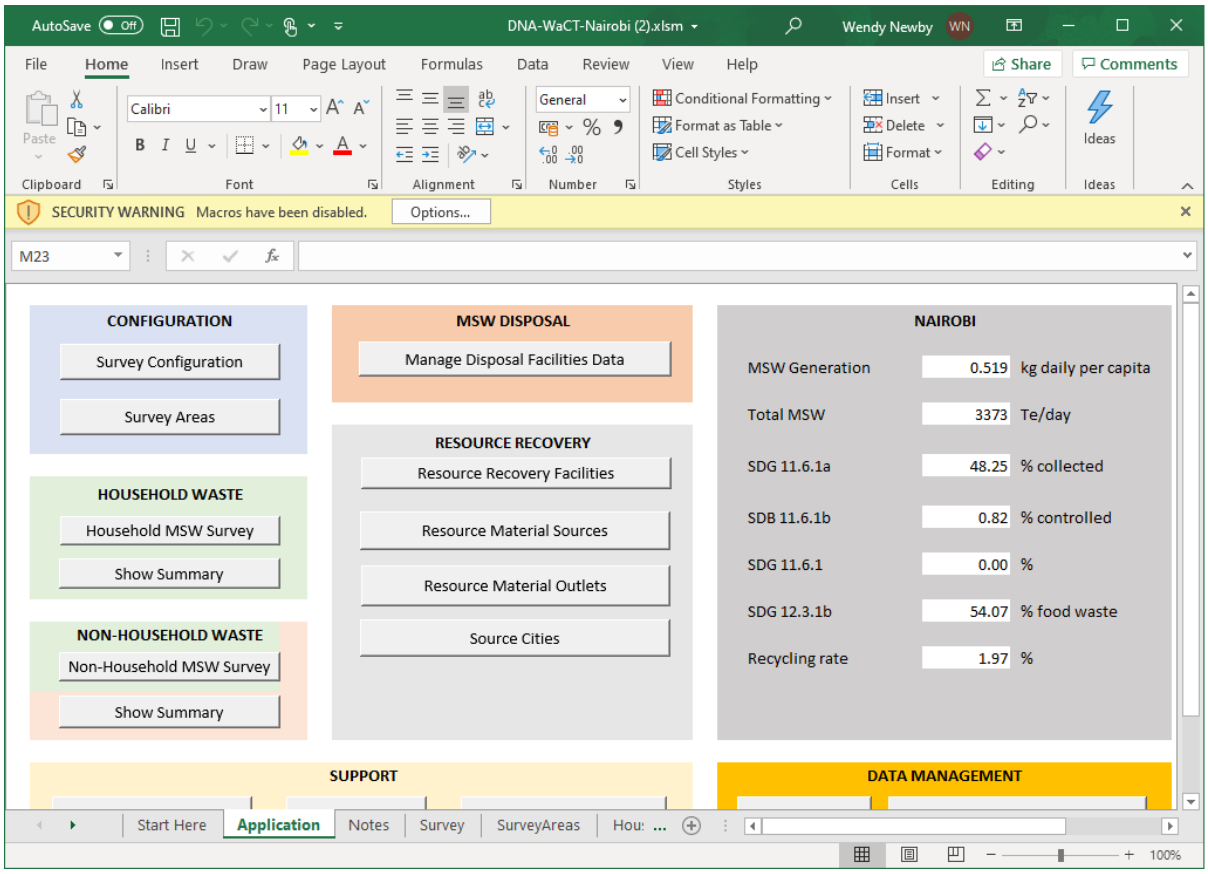


Choose the Macro Setting “Disable all macros except digitally signed macros”.

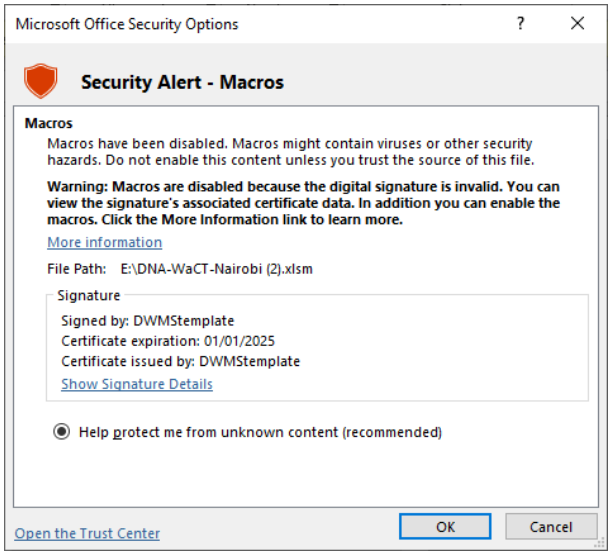
Clock OK buttons to save settings and exit back to the Excel program. Close Excel.

Step 2 Open WaCT Spreadsheet Tool and Save Certificate

Open the WaCT spreadsheet you should then see the SECURITY WARNING:



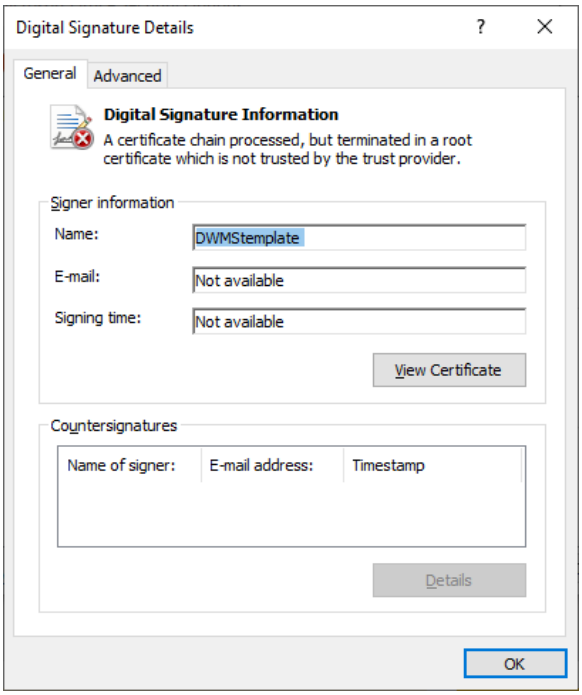
Click on Options.. button.



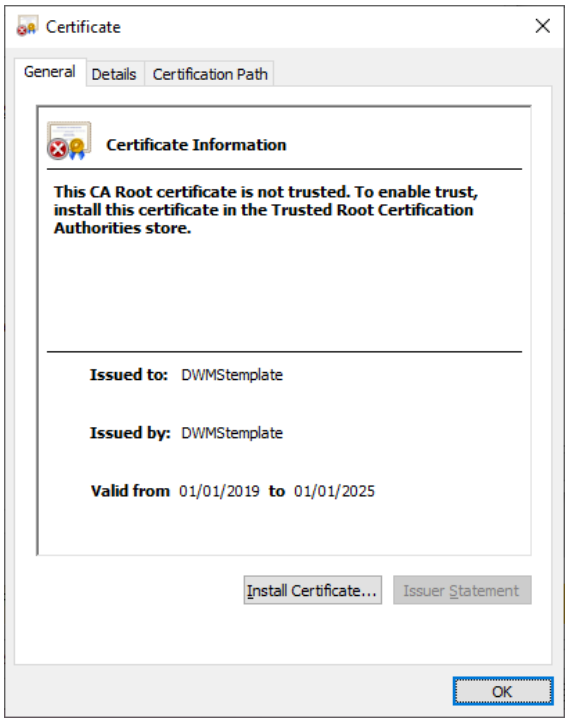
The dialog box that opens shows the certificate details that the spreadsheet model is digitally signed with.

Click on “Show Signature Details”

A further dialog box opens:

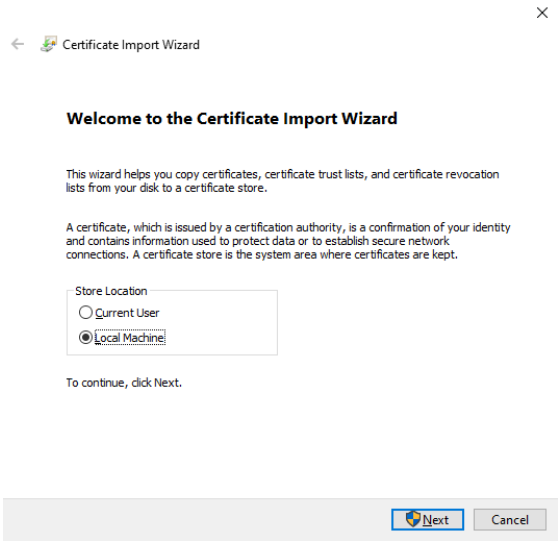


Click on the “View Certificate” button:

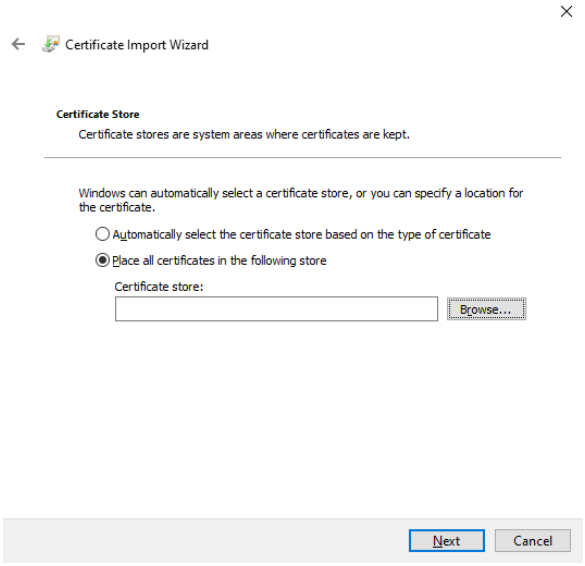


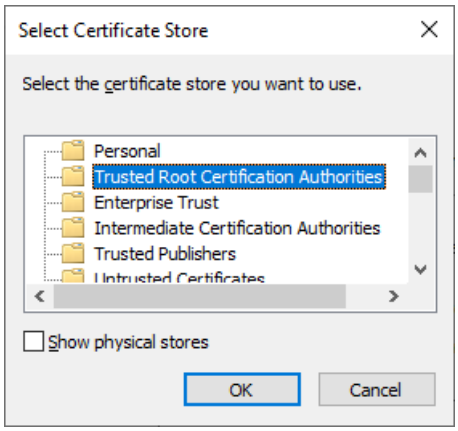
Now click on “Install Certificate..” and the next dialogue box opens:

Choose store location “Local Machine” and click Next button:



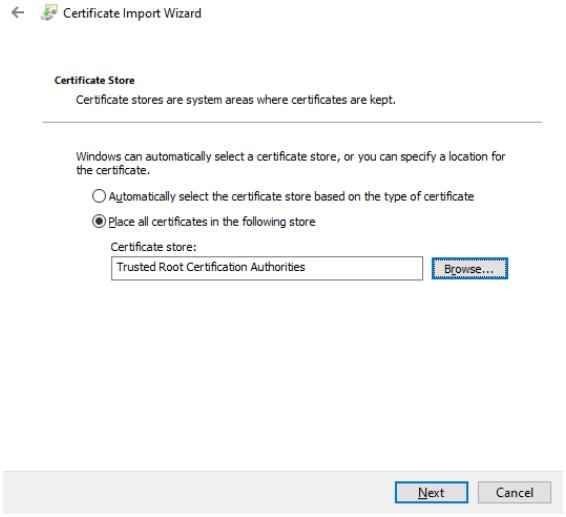
Now we choose where to save the certificate. To do this, you click on the “Browse..” button.

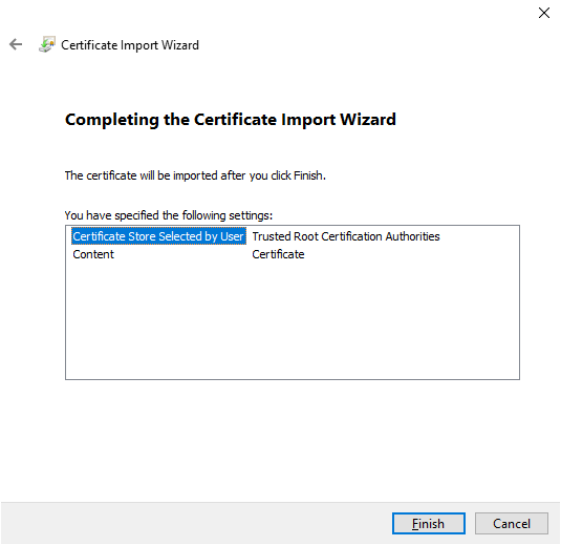




Choose “Trusted Root Certification Authorities” and click on the OK button.

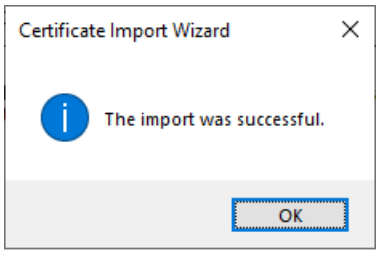
Having chosen the certificate store, click the “Next” button.





Then click “Finish” button to complete the certificate installation. You will get a confirmation:

A final dialog box will be displayed:



Select the option “Trust all documents from this publisher” and click OK.

Close Excel and reopen the WaCT spreadsheet application and the system should be fully functional.