PLASTICS RECYCLING TEMPLATE

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EXECUTIVE SUMMARY

RPS Group was engaged by Regional Development Australia Tropical North to support their investigation into the potential development of a plastic recycling and production industry in Far North Queensland, as a pilot for future regional centres across Australia.

The project incorporates the lifecycle of resource recovery from education, collection and processing, through to remanufacturing and aims to facilitate innovation in waste management and recycling, create local employment opportunities, and facilitate the development of circular economy products.

Across Australia significant volumes of plastic are being produced with low volumes being recycled.

This template has been designed to facilitate the replication of the feasibility study across other areas of Australia and provides a detailed overview of the assessment methodology undertaken.

This document is to be utilised in conjunction with an Excel spreadsheet that provides users a way to assess feasibility based on an in-built feasibility assessment calculation and user specified assumptions for potential costs and benefits. Appendix A provides instructions on how to use the Excel template.

The Project is supported by a grant provided to Regional Development Australia Tropical North Incorporated (RDATN) by the Australian Department of Industry, Science, Energy and Resources (DISER), the Queensland Department of Environment and Science (DES) and Cairns Regional Council.

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1.1 Background

Regional Development Australia Tropical North has engaged RPS Group to support their investigation into the potential development of a plastic recycling and production industry in Far North Queensland, as a pilot for future regional centres across Australia. The project incorporates the lifecycle of resource recovery from education, collection and processing, through to remanufacturing.

The aim of the project is to facilitate innovation in waste management and recycling, create local employment opportunities, reduce unnecessary freight costs, create product for export or sale, and facilitate the development of environmentally friendly products to be sold domestically. It also aims to assist regional areas to collect and manage their plastic waste, preventing leakages into the ocean and the pollution of our coastlines and waterways.

Plastic Use and Production

Plastics have existed for just over a century and are increasingly being used across economies in sectors ranging from packaging to construction, transportation, healthcare and electronics (1). Given they are lightweight, inexpensive, and durable, they have become indispensable in everyday life with the estimated global use of plastics in 2014 at 311 million tonnes (2). The World Economic Forum predicts that this will double again in 20 years and quadruple by 2050 (3).

90 per cent of plastics produced are derived from virgin fossil feedstocks which represent approximately 6 per cent of global oil consumption (4).

The Australian plastic production industry produces over 1.2 million tonne per year representing approximately 10 per cent of Australian manufacturing activity, and employs 85,000 people (5).

Key findings from the 2016-17 *Australian Plastics Recycling Survey - National Report* state that:

- A total of 3,513,100 tonnes of plastics were consumed in Australia in 2016–17
- A total of 293,900 tonnes of plastics were recycled in 2016–17, which is a reduction of 10 per cent from 2015–16 recovery rates
- Including tyres, total plastics recovery was 415,200 tonnes
- In 2016–17 the national plastics recycling rate was 11.8 per cent
- Of the 415,200 tonnes of plastics collected for recycling, 180,100 tonnes (43.4 per cent) were reprocessed in Australia and 235,100 tonnes (56.6 per cent) were exported for reprocessing
  - Over the preceding year, local reprocessing remained stable, while export for reprocessing fell by 20 per cent
- In 2016-17, Australians used 5.66 billion single-use plastic bags.

Whilst there are many types of plastic, they can be categorised into two groups: thermoplastics and thermosets (6). Thermoplastics become soft when heated and malleable or moulded when put under pressure, and as they cool, they solidify and retain their shape (6). The most common thermoplastics are summarised by types, properties and uses in Table 1 below.

Table 1 Types, Resins codes, Property and Uses of the most common Thermoplastics (6)

Resin Type	Resin ID Code	Properties	Uses
Polyethylene Terephthalate (PET)	1	Clear, tough and stiff. Resistant to chemicals and heat. Barrier for carbon dioxide and oxygen.	Soft drink bottles, fires in clothes, films, food containers.
High-Density Polyethylene (HDPE)	2	Balanced rigidity and impact strength, chemical resistance, crystalline melting point (130-135°C). Water vapour barrier.	Blow moulded products, pipes, buckets and mugs.
Polyvinyl Chloride (PVC)	3	Versatile, energy saving, adaptability to changing time and environment, durable, fire resistant.	Pumping pipes and other construction material, meat trays.
Low-Density Polyethylene (LDPE)	4	Low density, easy process ability, semi crystalline, low melting and softening point, chemical resistance, excellent dielectric properties, low moisture barrier, poor abrasion and stretch resistance.	Wrapping film, grocery bags and electrical coatings.
Polypropylene (PP)	5	Low density, excellent chemical resistance, stress resistance, high melting point, good process ability, dielectric properties, low cost, creep resistance.	Bottles such as syrup and yoghurt, straws, toys, medical containers
Polystyrene (PS)	6	Glassy surface, clear to opaque, rigid, hard, high clarity, affected by fats and solvents.	Electrical equipment such as plugs, sockets, switch plates. Wall tiles, washing baskets.
Other plastics			
Polycarbonate, nylon, acrylic, acrylonitrile butadiene, styrene	7	Many types of other plastics used in engineering designs	

Thermosets are initially heated and moulded into products, however, unlike thermoplastics, they cannot be remoulded simply by applying heat as they tend to break apart as a result of chemical cross-linking in the polymer during the curing process (7).

Health and Environmental Impacts of Plastic Waste

Plastic waste has gained significant attention in recent decades due to the increased awareness of environmental and health impacts seen around the world. Since plastics do not readily biodegrade, mismanagement of plastics leads to an accumulation in landfills and the natural environment.

Plastic waste is particularly harmful when it accumulates in aquatic environments. Plastic debris can block drains in towns and cities creating breeding grounds for harmful waterborne diseases. Aquatic wildlife can consume plastic materials, causing suffocation and particles to build up in their digestive systems, along with plastic molecules in their muscles. Once plastic enters the food chain it can create significant hazards to human and ecological health. The World Economic Forum reported that the best research currently estimates that enter over 150 million tonnes of plastic waste in the oceans today with at least 8 million tonnes of plastic leaking into the ocean annually.

The Tangaroa Blue Foundation coordinates the Australian Marine Debris Initiative (AMDI). The AMDI objectives include the removal of marine debris from the environment; the collection of scientifically robust and long-term data on what is removed and from where; and tracking the debris back to the source wherever possible. Ms Heidi Taylor, Managing Director of the Tangaroa Blue Foundation, stated that to date, more than 5.4 million marine debris items have been entered into the AMDI database. This debris has been removed from 1,729 sites and the weight of the debris has been totalled at over 500 tonnes.

Specific areas within the FNQ region where plastic debris has been reported at comparatively high densities include remote areas of north western Cape York and the Far North Great Barrier Reef at 400kg of debris per kilometre (7).

Alignment with Circular Economy Policies

The development of regional infrastructure also aligns with a range of policies that promote a circular economy approach to waste management. To reduce waste going to landfill and improve recycling rates in Australia, the Federal Government has proposed a *Recycling and Waste Reduction Bill 2020*. The proposed bill aims to phase in the end of unprocessed plastic, paper, glass and tyres that Australia ships overseas each year.

Developing regional recycling infrastructure will also support the following environmental and economic goals:

- Development of the local manufacturing industry and local employment
- Protection to the health of the Great Barrier Reef
- Supporting the Council of Australian Government (COAG) commitment to introduce a ban on the export of waste plastic, paper, glass and tyres and ensure measures to support the waste export ban are coordinated across, and meet the collective needs of, northern Australian jurisdictions
- Contributing to the reduction of total waste generated in Australia
- Improving the long-term sustainability of Australia’s recycling industry.

2 OBJECTIVES OF THIS TEMPLATE

The scope of the Plastic Recycling Feasibility Assessment project included provision of a pilot template replicable in other regions, to address waste and recycling challenges across regional Australia, particularly for those regions facing similar challenges to Far North Queensland (e.g. Northern Australia).

The aim of this template is to:

- Provide an overview of the methodology as it was applied to FNQ
- Summarise some of the relevant analysis of the current plastic waste management practices across FNQ, to demonstrate how the feasibility of developing a plastics recycling hub in the region was assessed
- Support the application of this methodology in other regions, by using FNQ as an example.

The Project is supported by a grant provided to Regional Development Australia Tropical North Incorporated (RDATN) by the Australian Department of Industry, Science, Energy and Resources (DISER), the Queensland Department of Environment and Science (DES) and Cairns Regional Council.

3 METHODOLOGY

3.1 Template Steps

A template assessment for the feasibility of a regional plastics recycling hub includes three main stages, which are:

1. Research and analysis
2. Options identification
3. Options assessment.

Section 4 explains how to undertake the research and analysis step. Section 5 explains how to undertake the options identification and assessment steps.

4 STEP 1: RESEARCH AND ANALYSIS

Primary and secondary research can be undertaken as guided by the excel document to support the identification and assessment of options. This research is likely to include discussions with stakeholders, including:

- Background research including review of local, state and federal policy
- Obtaining and analysing:
  - Socioeconomic data
  - Infrastructure data
  - Waste data
  - Market data.

The evidence obtained from these research activities provide a picture of the current state of plastic waste in the relevant region, and contextual factors that help narrow down the potential options for a feasible recycling hub in the region in question.

Key outputs from this research are a Material Flows Analysis (MFA).

For the FNQ assessment, the team used the following main publicly available data sources:

- Australian Government of Environment and Energy, 2018, Australian Plastics Recycling Survey 2017-18
- Queensland Department of Environment and Science Queensland Waste Data System (2018-19)
- Liaison with industry stakeholder to estimate volumes that are produced but not recycled.

4.1 Task 1A: Policy Review

Each regional plastic recycling project should be aligned to support the targets and objectives of existing policies related to plastic waste management in Australia. This may include policies and strategies at state and federal levels that aim to support a circular economy, minimise the impacts of human activities on the environment, encourage waste prevention, and promote sustainable solid waste management. These policies and strategies provide a set of principles and targets to guide decisions and achieve positive outcomes.

4.1.1 Federal Policies and Strategies

Our review identified that the *2018 National Waste Policy* provides a framework for collective actions by business, governments, communities and individuals until 2030.

The policy identifies five overarching principles underpinning waste management in a circular economy. These include:

- Avoid waste
- Improve resource recovery
- Increase the use of recycled material and build demand and markets for recycled products
- Better manage material flows to benefit human health, the environment and the economy
- Improve information to support innovation, guide investment and enable informed consumer decisions.

This policy was followed by a *2019 National Waste Policy Action Plan*. The Action Plan creates targets and actions to implement the *2018 National Waste Policy*. These targets and actions will guide investment and national efforts to 2030 and beyond. These include:

- Ban the export of waste plastic, paper, glass and tyres, commencing in the second half of 2020
- Reduce total waste generated in Australia by 10 per cent per person by 2030
- Achieve an 80 per cent average recovery rate from all waste streams by 2030
- Significantly increase the use of recycled content by governments and industry
- Phase out problematic and unnecessary plastics by 2025
- Halve the amount of organic waste sent to landfill by 2030
- Make comprehensive, economy-wide and timely data publicly available to support better consumer, investment and policy decisions.

4.1.2 State Policies and Strategies

A review of state policies and strategies should be undertaken to assess the relevant goals, targets and funding for the selected region.

4.1.3 Local Policies and Strategies

Similarly, a review of local government policies and strategies should also be undertaken to assess the relevant goals, targets and funding for the selected region.

4.2 Tasks 1B-1D - Regional Statistical Analysis

The first step involves reviewing the proposed region to determine the relevant population, demographic and socioeconomic profile of the region.

The FNQ study used Statistical Area Levels, which are geographical areas described as the largest sub-state region in the Main Structure of the Australian Statistical Geography Standard (ASGS) and have been designed for the output of a variety of regional data including data from the 2016 Census of Population and Housing and ABS Labour Force Survey Data.

For example, the Far North Queensland Area comprises Statistical Area Level 3 (SA3) - Far North and Statistical Area Level 4 (SA4) – Cairns. The FNQ region encompasses twenty-one local government council areas with a population of 286,799 people (2016). Approximately 54 per cent of the population live in the Cairns urban area, 35 per cent in the Douglas/Cassowary Coast and Tablelands area and 11 per cent in the Gulf, Cape and Torres area. The population is expected to grow to over 467,000 by the year 2050.

4.3 Task 1E – Material Flows Analysis

The Material Flow Analysis (MFA) quantifies the amount and composition of plastic waste material produced in the region over a specified time period (2020 – 2040). It sets the foundation for this Project by providing data on:

- How much and what type of plastic waste materials are being produced in different parts of the region each year
- The flow of this material from the source, to the end destinations, which include landfill, local reprocessing, interstate reprocessing and export
- How this is likely to change over the specified time-period.
- The MFA modelling for FNQ was based on analysing the following main datasets:

- *National Waste Database* (Blue Environment and REC, 2018)
- Queensland State of the Environment 2017 data
- Data from the Queensland Waste Data System (QWDS)
- Australian Packaging Consumption & Resource Recovery Data (APCO, 2019)
- 2017-18 Australian Plastics Recycling Survey (EnvisageWorks and SRU, 2019)
- Australian Bureau of Statistics (ABS) population and economic data.

The above sources were used to estimate the quantities, composition, source location, destination and likely growth of plastics in the region over the modelled time period.

5 OPTIONS IDENTIFICATION AND ASSESSMENT

5.1 Step 2: Options Identification

5.1.1 Task 2A: Regional Strengths, Weaknesses, Opportunities and Threats

A useful tool to understand what sort of recycling solution would be suitable for a region is the Strengths, Weakness, Opportunities and Threats (SWOT) framework. SWOT (or a similar approach) can be used to identify a shortlist of options for further analysis.

The FNQ assessment of comparative advantage included a review of the region's waste profile, economic profile, infrastructure and economic outlook. The project team considered the unique barriers and opportunities for the region with respect to developing a plastic waste recycling hub.

The aim of this assessment was to determine the sort of plastic recycling hub model that may prove advantageous given the region's unique assets and features. This assessment of comparative advantage was determined by organising the waste, economic and infrastructure data into a SWOT structure.

Table 2 summarises some of the questions explored as part of this SWOT exercise.

Table 2 Application of SWOT to determine appropriate recycling model

SWOT factors	Questions explored
Strengths	• Does the region contain sectors that provide a geographically concentrated source of plastic material to facilitate cost effective collection and transport? • Does the region contain sectors that provide a relatively homogenous (e.g. single polymer) stream of plastic material to facilitate cost effective recycling? • Are there locations within the region with effective access to major transport infrastructure (e.g. port, major rail or road-route for freight etc.) to facilitate export to key material buyer markets? • Are there industries in the region that can readily use products made from recycled materials?
Weaknesses	• Are waste volumes geographically dispersed? • Are waste streams highly mixed in terms of different plastic polymers or material types? • Are remote locations inaccessible through existing transport infrastructure?
Opportunities	• Does the region have any burgeoning manufacturing hubs? • Are there any major transport infrastructure projects targeted for the region? • Are existing trade destinations serviced by the region's transport infrastructure likely to increase their demand for plastic materials?
Threats	• Are volumes likely to decrease due to population or economic decline? • Which environmental assets are particularly vulnerable to degradation from plastic pollution?

A stakeholder workshop held on 15 October 2020, included a SWOT analysis for plastic recycling in FNQ. A summary of the findings is presented below.

The workshop identified the following **strengths** for FNQ for the proposed plastic recycling facility:

- Existing local markets to sell into including Regen Plastics, Mungulli Milk, Babinda Springs, and Cairns Natural Springwater
- Potential customers in the state who prefer to buy local (Local Buy)
- Existing infrastructure and collection systems in place that can be utilised including the Cairns MRF, Containers for Change, Drummuster, Ecycle, Mobile Muster etc.
- Access to port, rail and road infrastructure providing access to the Southeast Asian market.
- Comparative high representation of some industries (e.g. agriculture and health services) with low diversion rates offering opportunity for improvements
- Funding opportunities at state and federal government levels.
- Legislative drivers including the ban on single use plastics and ban on the export of plastic waste are likely to increase customer demand for recycled content.

Weaknesses that were identified during the workshop included:

- Disaggregated sources across the FNQ region with large distances and low volumes
- Low manufacturing base in FNQ
- Large distance to manufacturing hubs in southern states
- Low rate of diversion at present – averaging 1.9% across the region resulting in infrastructure for diversion not being set up, particularly with C&I waste
- Comparatively high cost to recycle at present in this region

Opportunities identified during the workshop included:

- Potential to source homogenous streams of plastic from some sectors including agriculture and health services, which provide relatively higher market value and facilitate a circular economy approach
- Technology providers have indicated to government that they have sustainable solutions for the region's plastic waste.
- Strengthening market for PET, with Coca Cola Amatil purchasing almost the entire supply of Recycled PET (rPET) in Australia.

Threats identified included infrastructure spending in other hubs including SEQ and Victoria.

5.1.2 Task 2B: Environmental and Economic Objectives

The options are to be selected and analysed based on how well that are likely to meet the following environmental and economic objectives of a recycling hub in the region in question. For example:

- Application of the waste hierarchy
- The imperative to divert waste from landfill and from leakage into the environment, particularly the Great Barrier Reef (GBR)
- Job creation and economic development
- The drive towards a circular economy.

An option that is likely to achieve more of these objectives is preferred over others.

5.1.3 Task 2C: Short-term and Long-term options

The outcome of the preceding tasks would be an agreed list of:

- Short-term options to be quantitatively analysed, which present immediate opportunities for the region in question
- Long-term options that may be become viable in the future depending how the markets for recycled material develop.

5.2 Step 3: Options Assessment

Once the shortlisted options are identified, they can be assessed to understand their economic and financial feasibility. Three main analytical tools to be used for this assessment are:

- Cost Benefit Analysis (CBA), to estimate the economic, environmental and social benefits and costs of each option from a state perspective
- Economic Impact Assessment, to estimate the impact of each option on regional employment, wages and economic activity
- Financial Assessment, to estimate the costs, revenues and potential funding scenarios for the recycling hub.

The methodologies for these assessments are summarised in the following subsections. The report should include technical details relating to the analyses, including key parameters and assumptions, and their sources.

The following subsections describe the main assessment steps, how they were conducted, and what they contributed to the overall assessment.

5.2.1 Task 3A: Assumptions Research

Economic and financial analysis requires first researching the assumptions that would apply for that region. The attached Excel workbook outlines the assumptions to be researched (refer to worksheet “Feasibility assumptions”). These assumptions include:

- General assumptions
- Collection costs
- Sorting and infrastructure costs
- Transport to landfill or recycling hub
- Landfill costs
- Recycling infrastructure costs
- Transport to markets
- Market values
- Litter reduction
- Embodied greenhouse gas (GHG) emissions.

5.2.2 Task 3B: Cost Benefit Analysis

It is recommended that the assessment use Cost Benefit Analysis (CBA), also known as welfare economics, to estimate the economic, environmental and social benefits and costs of shortlisted options.

CBA requires:

- defining the ‘factual’ (i.e. with recycling hub scenario) and the ‘counterfactual’ (i.e. without recycling hub scenario)
- understanding the incremental difference in outcomes between the two scenarios (i.e. how much additional benefits are gained or costs incurred due to the recycling hub)
- estimating the net benefit (or cost)
- expressing the results as a Benefit Cost Ratio (BCR) and Net Present Value (NPV), which is the ratio of benefits to costs, or incremental benefits, respectively.

This approach is often used by government decision makers to evaluate policy or project decisions. The CBA should be forward-looking, and evaluate the impacts of operating a recycling hub over a selected time-period. In the case of the FNQ assessment, the selected time-period was 2021 to 2041.

The FNQ CBA used data from the literature on the market and so called ‘non-market’ value of project outcomes.

Some outcomes were conducive to valuation with reference to market prices (e.g. the value of recovered plastic material). Other outcomes required non-market valuation techniques. Non-market valuation is applied by either surveying beneficiaries about how much they value certain outcomes (i.e. ‘stated preference’) or deriving an estimate for that value based on the behaviour of beneficiaries (i.e. ‘revealed preference’).

This assessment utilised market and non-market value data from other previous researchers' published work, rather than undertaking original surveys or market data analysis for valuation. This method known as the 'benefit transfer' approach.

The CBA calculated the total benefits and costs of projects over the life of the projects, using a 7 per cent discount rate to compare future year benefits and costs, to current year values in Present Value (PV) terms, as recommended by the Building Queensland (2020).

Total benefits and costs were expressed as a Present Value (PV), which represents the aggregate value of all years of benefits or costs after applying the discount rate. Total net benefits were expressed as a Net Present Value (NPV), which is the difference between the PV of benefits and the PV costs. Sensitivity testing was undertaken to test the robustness of results to alternate values for key uncertain assumptions.

5.2.3 Task 3C: Economic Impact Assessment

Regional economic development is an important driver for most regional capital investment projects. A regional recycling hub assessment should estimate the impacts of establishing a hub on employment and economic activity.

For FNQ, the team estimated the impact of a recycling hub on key economic variables using Input-Output (I-O) analysis. I-O models can provide useful information and analysis on the industrial structure of an economy and, if used appropriately, to assess the impacts of policy changes (Gretton, 2013).

Economic modelling estimated the impact of short-listed options on:

- industry output
- employment
- wages and salaries
- Gross State Product (GSP).

The output from an industry represents the market value of goods and services produced. If an intervention is expected to change industry output (e.g. through higher demand for goods and services from an industry), I-O modelling can estimate the associated change in employment, wages and salaries, and industry value added[1]. The sum of industry value added across all industries in Queensland provides the Gross State Product (GSP) for Queensland.

5.2.4 Task 3D: Financial Analysis

Financial modelling should be used to determine the financial viability of a recycling hub. For example, the FNQ Financial Analysis estimated the costs and revenues of the recycling hub, and whether there was likely to be a funding gap that needs to be addressed.

The analysis estimated the recycling hub's cash inflows and outflows each year between 2021 and 2041. The cashflows were then used to estimate an Internal Rate of Return (IRR) for the project, which is an estimate of the return on capital investment.

The IRR should be compared against the likely Weighted Average Cost of Capital (WACC) of a private investor. The WACC represents the weighted average return expected by the financiers of a company (e.g. lenders and shareholders), and is therefore the benchmark minimum return investments should achieve.

[1] Industry value added is measured as the market value of outputs minus the inputs used in that production (i.e. capital, labour and natural resources).

If the IRR is less than this minimum benchmark or ‘hurdle rate’, this suggests that the project has a funding gap. Moreover, private sector financial investors are likely to only provide financing, including debt and equity financing, if the funding gap is covered by the public sector or other external funding sources (e.g. through non-government organisations). Therefore, the funding gap indicates the likely level of public sector commitment to underpin the viability of the project.

5.2.5 Overall Assessment

While the analyses listed above provided useful data to evaluate the feasibility of the project, the ability of the option to meet the defined environmental and economic objectives should be the key assessment consideration. The analyses support the assessment by providing data on the likely performance of the options, from an economic and financial perspective, in meeting these objectives.

6 CONCLUSION

This template can be used to investigate the feasibility of establishing a plastics recycling hub in a particular region.

The need to increase plastic recycling is underpinned by a range of local, state and federal government policy initiatives, and widespread concern about the environmental and health impacts of plastic in the environment.

A key challenge for regional waste infrastructure investment is sparse population and dispersed volumes, which reduce economies of scale and increase transport costs.

Against this backdrop, a hub and spoke recycling model may provide significant economic, environmental and social benefits to the region.

Suitable options for a region can be determined by assessing the region's unique strengths, weakness, opportunities and threats. The analytical tools in this template can then be used to assess the shortlisted options in detail.

Government can play an important support role in facilitating investment in the hub by providing information, tools and resources and brokering (i.e. matching supply with demand).

In addition, government programs to increase market development are also recommended, including implementing purchasing policies supporting the purchase or recycled plastic products from the local region, and developing a regional waste strategy.

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Appendix A Instructions for Excel workbook

Overview of Workbook

The workbook provides users with in-built calculations to support the financial, economic and environmental feasibility assessment of the proposed hub. The workbook has three sections:

1. The Cover and Instructions sheets
2. The Input worksheets
3. The Results worksheets

Cover and Instructions

The Cover sheet describes the workbook and provides a date for when it was last updated.

The Instructions sheet provides step by step guidance on how to undertake a feasibility study and operate the Excel template, with links to the relevant worksheets for each step.

Input Worksheets

Users should enter the material flow analysis data and feasibility assumptions in the indicated cells of the *Material flows* and *Feasibility assumptions* sheets respectively.

The sheets allow users to enter data and assumptions for up to two polymers.

The Feasibility assumptions sheet allows users the choice of two methods to enter cost assumptions, which are the “All-in unit” cost method (which allows users to directly specify the cost expressed as a $ per tonne of waste), or the “Build-up” method (which calculates the $ per tonne cost based on assumptions about capital and operating costs, volume and asset life). Users should select the preferred method using the drop-down provided in the cyan shaded cell.

Some cost assumptions can be entered for both the Base Case (i.e. no hub investment) and the Project Case (i.e. hub establishment), while others only apply to the Project Case as indicated.

Results Worksheets

The results of the feasibility assessment, driven by the data and assumptions entered by users, are presented in the following worksheets:

- **Environmental impacts:** which provides results for tonnes diverted, recovery rates, litter and GHG emissions
- **Economic feasibility:** which provides the results of the CBA
- **Financial feasibility:** which provides the results of the Financial Analysis.

The Excel template does not calculate economic impacts, as these should be estimated using bespoke I-O modelling (or similar) of the region.