Northern Australia Environmental Resources Hub Project 2.1 – Addressing management of waste and marine debris in remote Northern Australian communities including Cape York

Pormpuraaw Community Case Study

Ghostnet Octopus by Steven Keppel at Pormpuraaw, 2016

Acknowledgement

The Regional Advisory & Innovation Network (RAIN) Pty Ltd wishes to thank the community of Pormpuraaw, the Pormpuraaw Aboriginal Shire Council and Pormpuraaw Land & Sea Management, the Pormpuraaw Arts & Culture Centre Inc. and all individuals who contributed their time, advice and insights to the *Pormpuraaw Community Case Study on Remote Municipal Waste and Marine Debris Management*.

Disclaimer

This document (Case Study) has been produced independently by the Regional Advisory & Innovation Network (RAIN) Pty Ltd for the North Australia Indigenous Land & Sea Management Alliance Ltd (NAILSMA).

The Case Study has been prepared for the Northern Australia Environmental Resources Hub which forms part of the Australian Government's National Environmental Science. The NESP NAER Hub supports sustainable development in northern Australia. Further information can be accessed at http://www.nespnorthern.edu.au/nesp/.

The information, statements, statistics and commentary (together the 'Information') contained in this Case Study have been prepared by RAIN from publicly available material and from discussions held with stakeholders. While RAIN has exercised all due care in the preparation of the Case Study and believes that the information, conclusions, interpretations and recommendations of the Case Study are both reasonable and reliable, RAIN does not express an opinion as to the accuracy or completeness of the information provided, the assumptions made by the parties that provided the information nor any conclusions reached by those parties.

RAIN makes no warranty in respect of the Case Study, particularly with regard to any commercial investment decision made on the basis of the Case Study and is not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever, which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect to any representation, statement or advice referred to here. Use of the Case Study by the client or third parties shall be at their own risk.

Copyright

Aboriginal and Torres Strait Islander peoples are warned that this document may include images of people who are deceased

Table of Contents

Executive Summary

This Community Case Study forms one of three research case studies compiled by the Regional Advisory & Innovation Network (RAIN) Pty Ltd together with the participating Aboriginal communities of Lockhart River, Mapoon and Pormpuraaw, all of which are located in Australia's remote Cape York Peninsula (CYP) region (Map 1). With respect to marine debris, selected data from all three communities (sourced from the Australian Marine Debris Initiative (AMDI) database) was also incorporated into each case study[1].

A further output of the research project is a compiled Case Studies Report, highlighting the key findings of all three CYP community case studies undertaken during the research project and providing a comparative overview of pan-CYP opportunities for improved waste management and recycling efforts into the future. Additionally, the compiled report incorporates waste and debris data from selected other CYP locations. Further, that report makes direct reference to current and past efforts by Cook Shire Council (CSC) to investigate regional recycling options, waste stream logistics and constraints and related cost/benefit analysis, in addition to outlining the waste management approach taken by CSC in terms of its jurisdiction.

The purposes of this Pormpuraaw Community Case Study are:

- to document the current marine debris and municipal waste management efforts undertaken in and around the Pormpuraaw Aboriginal Shire of Cape York Peninsula, Australia;
- to identify existing marine debris and municipal waste management gaps;
- to document viable local solutions and opportunities for positive change to the present waste loads impacting the communities, homelands and foreshores of the wider Pormpuraaw region; and
- to outline viable approaches towards implementing a local Container Deposit Scheme (CDS) (referred to in Queensland as a container refund scheme, the term this report adopts).

Other draft outputs produced from field visits and direct discussions include a tailored suite of priority Waste Reduction Plans (using adapted Source Reduction Plan templates developed by Tangaroa Blue Foundation (Tangaroa Blue)), local waste stream mapping and a community waste stream education poster for each community. These have been provided to participating communities for further review and action.

The Pormpuraaw Aboriginal Shire Council (PASC), formally established under the *Local Government Act 2009* (Qld), is responsible for municipal waste management and other community services provision across the Pormpuraaw Aboriginal Shire. The Council's environmental and cultural heritage management arm is Pormpuraaw Land & Sea Management (PLSM) which permanently employs six local Aboriginal rangers.

Research for the case study was conducted at Pormpuraaw itself, primarily engaging PASC senior officers, staff, some elected representatives, members of Nganchin Raak Mela Aboriginal Corporation and TLOs of homelands within the Shire. Following advice from the relief community store manager, consultations were also held with the Director of the Retail Stores Branch[2], about current recycling efforts undertaken by their retail stores operating in remote CYP communities, including the main Pormpuraaw community store.

[1] AMDI data sets contributed by the Napranum Aboriginal community have been included in research for this project given the close proximity of both communities to the larger regional centre of Weipa. AMDI data sets contributed by Lamalama Traditional Owners for Yintjingga Aboriginal Corporation-managed Aboriginal freehold lands adjacent to Princess Charlotte Bay CYP have informed overall case study findings.

[2] An independent operation chaired by the Director General of the Queensland Department of Aboriginal and Torres Strait Islander Policy (DATSIP). At the request of local retail store managers the authors spoke with Eoin Quinvilan, Director Retail Stores Branch in October 2016.

The key issues highlighted by local parties are:

- Illegal dumping in remote areas of the Shire
- Implementing a locally viable container refund scheme
- Higher capacity recycling equipment
- Meeting regulatory compliance requirements
- Retail waste, including recycling of packaging
- Coordination of local recycling opportunities and effort
- Community education about recycling and waste separation

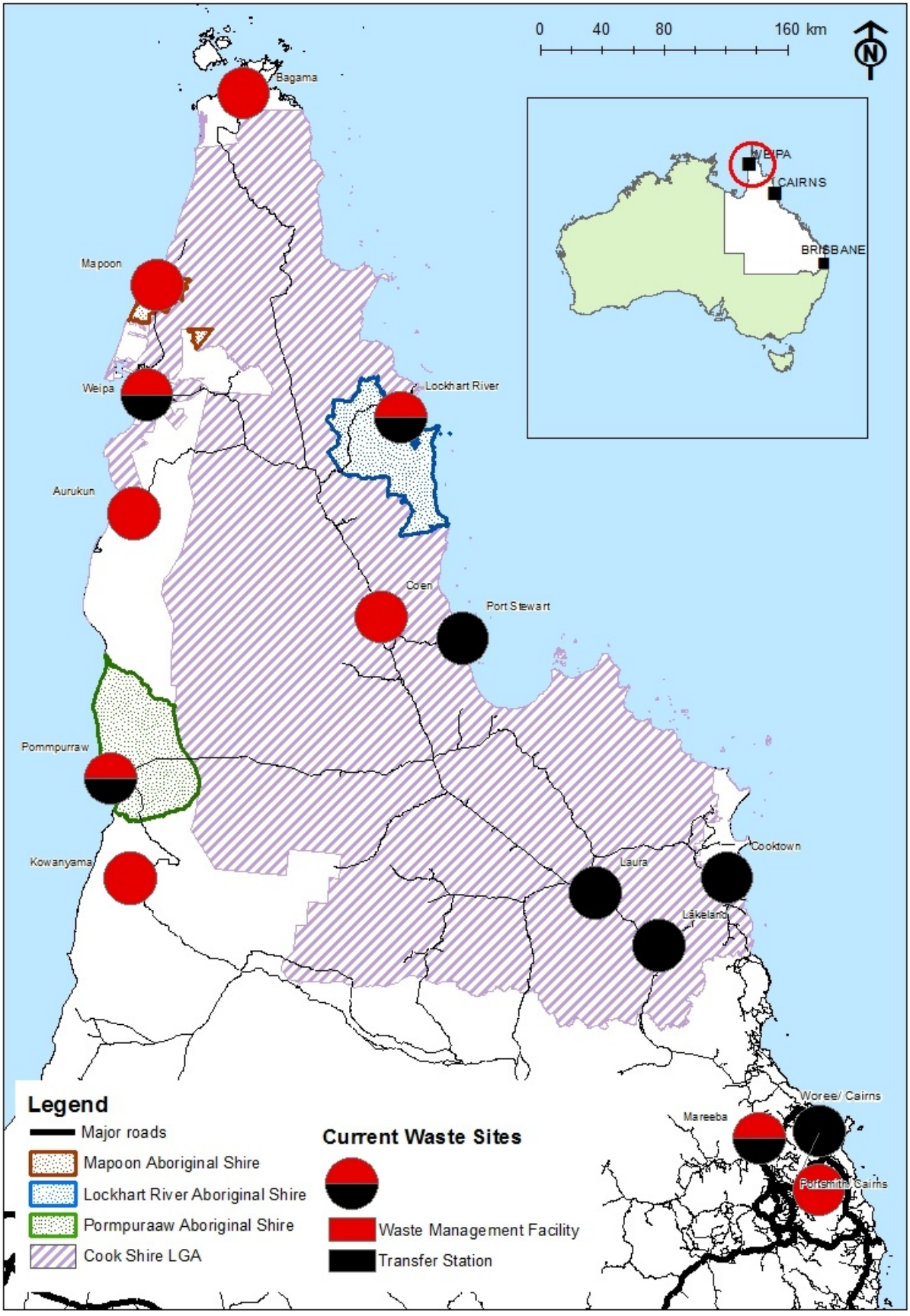
Key local findings relating to municipal waste management:

- Landfill sites operations are improved by having clearly delineated areas for separated mass contractor-generated waste (in particular for Commercial and Industrial waste (C&I), Construction and Demolition (C&D) waste) and for general community waste (Municipal Solid Waste (MSW)).
- Currently observed best practice in this community includes the entire landfill site being enclosed in high standard exclusion fencing with locked access to contractor-specific waste disposal areas. General community waste areas are also lockable, with designated times in place for landfill access.
- Efforts to maintain separation at landfill sites definitively assists in extending a site's lifespan, and in pooling potential recyclables (eg: old tyres, used car batteries, old cars, waste oils, pallets, crushed cans) for local re-use and/or periodic on-site shredding / bailing / crushing for bulk back-loading.
- Back-loading of priority toxic waste (eg: waste oils, car batteries) and recyclables (eg: pre-crushed and bailed aluminium cans, bailed cardboard) is achievable if well targeted and locally arranged with transport operators servicing remote community.
- Weather-proof storage for recyclables is required to amass viable recyclable back-load volumes.
- Reduction in single use plastic bags is achievable where in-store alternatives are made available.
- High attrition rate of 'wheelie-bins'.

Key local findings relating to marine debris:

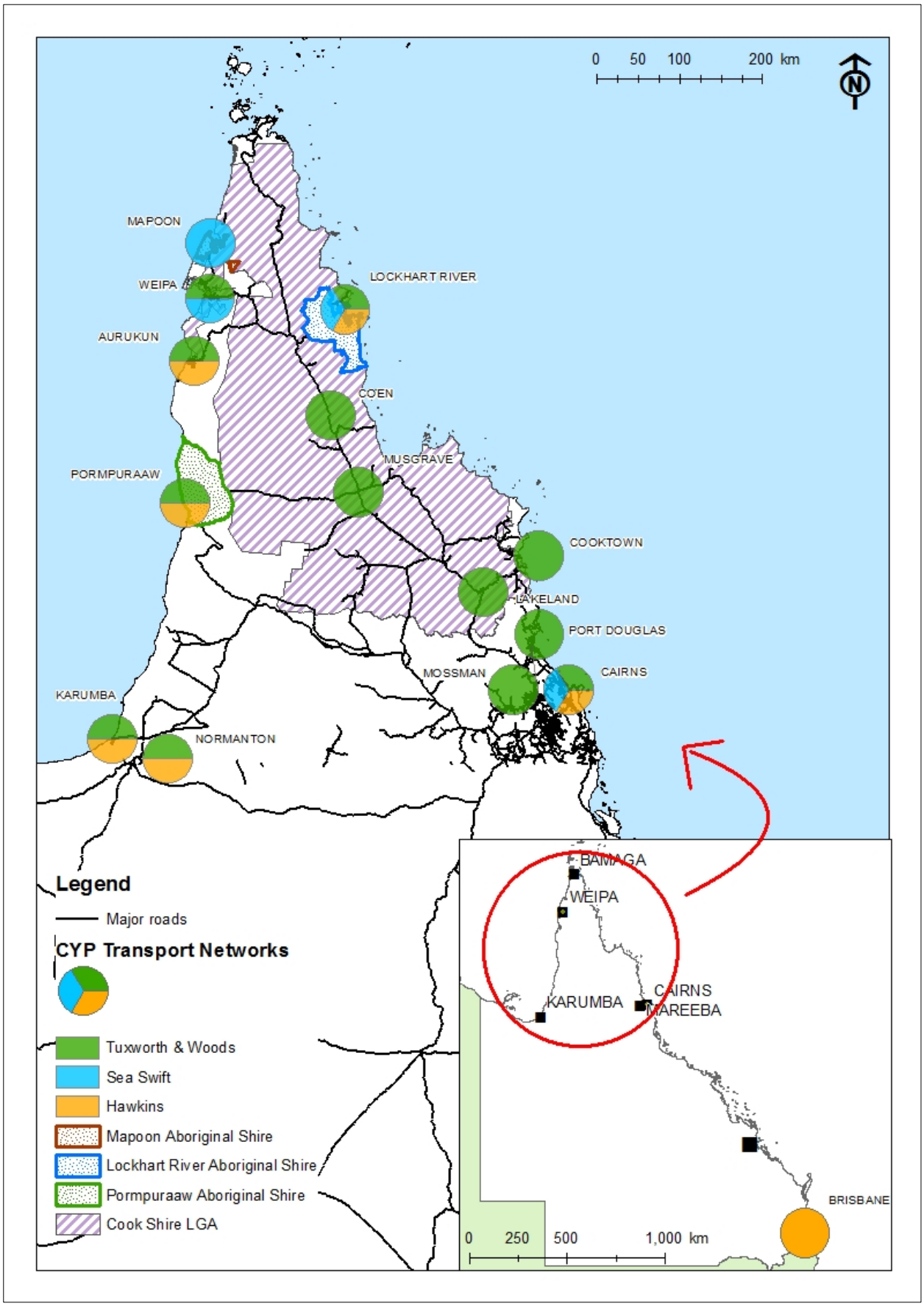
- Illegal dumping by commercial fishing operators (and others) remains a costly problem for PASC and PLSM, in particular its removal from very remote, ecologically sensitive regions.
- Local hot spots for marine debris include estuaries, river mouths and the lower reaches of local waterways. Major debris items of concern include refrigeration gas containers and steel bottles.
- Increasingly, marine debris is observed to be originating from domestic fishing vessels (eg: empty oil and lubricant containers, plastic water bottles, broken fishing gear, storage containers, litter).
- Numbers of ghostnets arriving locally have been observed to have fallen in recent years - thought to be directly attributable to Indonesia adopting a zero tolerance policy on *illegal, unreported and unregulated* fishing activities in its territorial waters; and to GhostNets Australia's coordinated collective efforts across northern Australia to remove nets over more than a decade and their encouragement of behavioural change in net/debris disposal in neighbouring community fisheries.
- Not many entanglements are observed locally. Where entanglement evidence is observed in locally removed nets, bones are predominately old, with distressed and deceased animals not present.
- Ghostnets and marine debris (amongst other waste) are increasingly important resources for local artists employed by Pormpuraaw Arts & Culture Centre Inc. Individual artworks can attract high prices in contemporary national and international art markets. There is now an acute local shortage in Ghostnets which is seeing local artists retrieving safely useable waste from the local landfill. For example, contractor waste (high tensile steel cable) is being used to build new structural artworks.

Map 1 – Case Study Communities Location Map



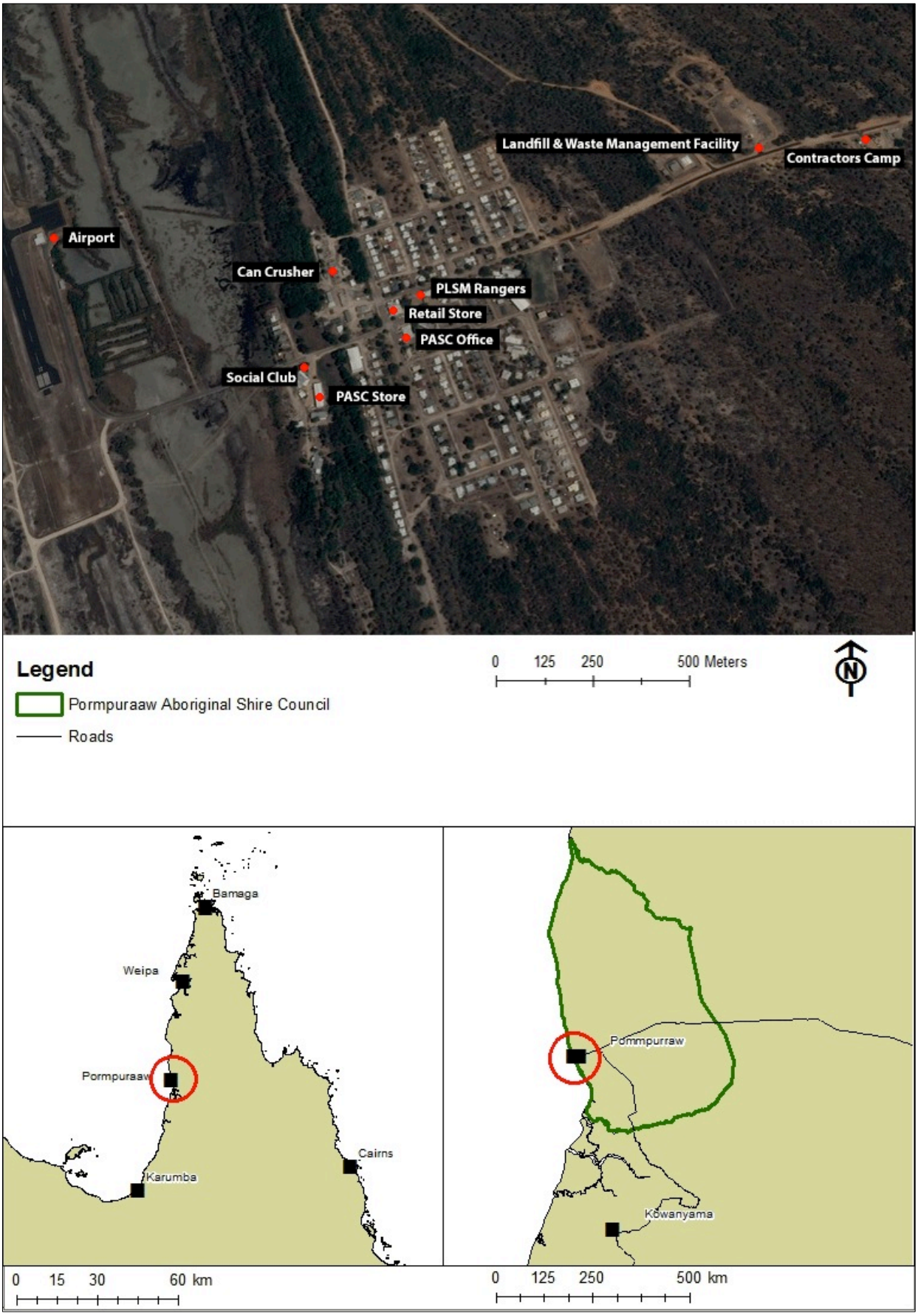
Map 1

Map 2 – Selected CYP Transport Networks (2016)



Map 2

Map 3 – Pormpuraaw Community Map



Map 3

Findings

Pormpuraaw currently benefits from relatively well managed waste and debris management arrangements. However, much like anywhere else in Australia, change in local behavioural norms and attitudes towards waste conscious lifestyle changes, household rubbish separation and community recycling efforts requires substantive capital infrastructure investments, tailored educational campaigns and locally viable incentives.

PASC and PLSM state that Queensland Health Environmental Health Branch staff have advised that the Pormpuraaw municipal waste facility is the best regional example of compliance within CYP.

At the end of the road, a world away from the mainstream

Pormpuraaw is located some 220kms west of the Peninsula Development Road (PDR) at about Musgrave in central CYP on the traditional homelands of the Kuuk Thaayorre people, however the community is also home for Kugu and Mungkan families whose ancestral homelands are situated within the Pormpuraaw Shire, as well as some Bakanh, Wik speaking and Yir Yoront families whose homelands extend across into the Shire from adjacent areas[3]. Homelands to the west of a 1897 gazetted reserve boundary were quarantined from selection for colonial pastoral runs. Pormpuraaw is unique in terms of its post-contact history: the former Edward River mission was set up comparatively late in 1938 (as an off-shoot of the Mitchell River Anglican mission) with missionary work ceasing in 1967. Connections to homelands and knowledge of local Aboriginal languages remain strong.

Pormpuraaw region Aboriginal lands extend north from the Coleman River to the Holroyd (South Kendall river) and inland to a boundary generally extending along the original extent of the 1897 gazetted reserve boundary. Some 4,662 km^2 in size, the area features undeveloped landscapes within the lower catchments of several rivers entering the Gulf of Carpentaria, which furthermore comprise the bulk of the Northern Holroyd Plain Aggregation, a wetland of national significance and intake for the Great Artesian Basin. The region features vast floodplains subject to absolute extremes in seasonal inundation, chenier dune systems, dune scrub, riverine galley forests, coastal plains and diverse savannah landscapes. Seasonal freshwater and saltwater (estuarine) interchanges extend across the entirety of the area. Bull Lake - a highly restricted cultural place and native and migratory species drought refuge – is also a wetland of national significance.

Traditional Land Owners (TLOs) and Pormpuraaw Land & Sea Management (PLSM) Rangers protect these unique cultural landscapes and manage threats to their impressive natural values. Local management includes invasive species control; native species predation control; registered carbon abatement; strategic threat abatement to protect endangered species; visitor management; training and skills development.

Western CYP is characterised by larger discrete Aboriginal landholdings (Aurukun Aboriginal lands, the Pormpuraaw DOGIT and Kowanyama Aboriginal lands) and extensive term leases (primarily for grazing). Most neighbouring privately-held leasehold properties (all of which are situated outside of the Pormpuraaw Aboriginal Shire) either establish on-site dumps where waste is frequently incinerated and/or buried or else periodically transferred out where costs are not excessively prohibitive and opportunistic logistics are favourable. Opportunities for mutual collaboration are further explored and scoped below.

[3] Bakanh families are generally associated with the Strathgordon area; certain Wik language speaking families are associated with upstream areas of the Holroyd (south and main Kendall) River and the Southwell area or with certain homelands in the Christmas Creek (Holroyd River) area; whilst certain Yir Yoront families are associated with certain sections of the Coleman River and areas within the southern part of the Pormpuraaw DOGIT.

Unique local circumstances

PASC presently holds the whole of the Shire area as the trustee of the Pormpuraaw Deed of Grant in Trust (DOGIT). PLSM is an operational arm of PASC and actively manages the diverse and significant biocultural values of the region. All PASC Councillors elected in 2016 hold primary connections to ancestral homelands within the DOGIT. All PLSM ranger staff are TLOs. Native title rights and interests for the northern extent of the DOGIT between the Holroyd (locally known as South Kendall) and Edward rivers (locally known as Breakfast Creek) are held by Ngan Aak-Kunch Aboriginal Corporation RNTBC (NAK), with the southern extent of the DOGIT subject to an active native title claim not as yet determined. Neighbours include NAK-held lands within the Aurukun Shire, leasehold lands (Aboriginal-held and non-Indigenous-held) and Aboriginal freehold lands situated within the Kowanyama Aboriginal Shire. This degree of localised complexities in intersecting land-holding and native title holding arrangements is relatively common on CYP. The implications for better coordinated waste management or recycling efforts at localised or regional scale are considerable and substantive, and are further discussed below.

Given recent changes to statutory biosecurity arrangements in Queensland, effective and timely control of stranded debris, invasive species and biosecurity risks are critical aspect of retaining local ecological values and in reducing potential liabilities arising from invasive species, including related land productivity losses. In 2015, PASC and PLSM compiled and endorsed the Shire *Pest & Biosecurity Management Plan 2015-2020*.

PASC must prepare a local government planning scheme setting out, amongst other matters, the Council's municipal waste management policies and any designated local municipal waste management sites. The population base of this remote community is expanding, with new housing constructed in recent years to address over-crowding and a growing local population: some 40 new houses have been constructed in the last 5 years. The singular challenges of exponentially increasing regulatory and compliance burdens facing remote Aboriginal Shires, which do not have a viable rates base but which are rapidly growing in their respective populations, are examined as part of the *Implementation* and *Recommendations* sections below.

Ever increasing costs and onerous regulatory compliance burdens

The Queensland Audit Office's recently released long term sustainability forecast for local government[4] highlights asset condition maintenance data; asset management plans; scalable project decision-making frameworks, direct community engagement and effective planning as key areas for local government improvement. This finding applies to local government across the board - regardless of size, jurisdiction (coastal, Indigenous, resources, rural/regional, rural/remote and South East Queensland) or revenues.

Further, in the period since introduction of related reforms by way of the *Local Government Act 2009* (Qld) statutory planning obligations placed on councils changed in 2012 with removal of requirements to develop 10 year Financial and Community plans. However all case study communities participating in this project have existing 10 year community plans, developed by their respective local government councils in 2011.

PASC is required to prepare and adopt a local government area planning scheme for the Shire under the *Sustainable Planning Act 2009* (Qld). However, land use planning for local governments into the future will come under the provisions of the newly enacted *Planning Act 2016* (Qld) which comes into force mid 2017. The aim of these planning reforms, according to the Queensland Government, is to streamline the number of state planning instruments, to introduce a single related statutory instrument (the Minister's Guidelines and Rules), to give local governments more flexibility in how they work with their respective communities

[4] State of Queensland (2016) *Forecasting long-term sustainability of local government 2016-2017* Queensland Audit Office

on local planning schemes and to define a limited number of mandatory elements for local schemes rather than requiring adherence to the current, very large and highly prescriptive structure for planning schemes[5].

Whilst local planning schemes can provide guidance to Council about environmentally sound site location and provide insights into a local government's waste management, waste disposal and recycling objectives, the real work has to be done by Council staff, by any local contractors (engaged in waste service provision) and by the remote community itself. There are 3 casual staff employed to undertake kerbside and town garbage collections during each working week, servicing various areas of the township on a rotational basis.

Remote CYP community of Pormpuraaw showing PASC municipal landfill to the front left, 2016

The Problems

> ***Natural Environment – It Begins With Each Of Us****: To ensure the natural environment is protected in a way that is not compromised for future generations and is managed so as to minimise our impact on non-renewable resources.*[6]

PASC is required to operate to the same regulatory compliance standards as any other Queensland local government entity, but in absolutely remote circumstances and without any form of rates-based income.

In addition to representation and participation, regulatory, community planning and coordinating functions PASC has a clear service function to ensure Pormpuraaw is a healthy, vibrant, contemporary and connected community, by providing well-managed and maintained community facilities and effectively delivering on roads, essential services (water, waste and sewerage), environmental health, parks and gardens, aged care, disability services, library, airport, building and maintenance services and community and business services

[5] http://www.dilgp.qld.gov.au/planning-reform/plan-making/an-improved-system.html

[6] Pormpuraaw Aboriginal Shire Council Annual Report 2014-2015 *Objectives and Strategies* p.21 http://www.pormpuraaw.qld.gov.au/planning.htm

(fuel, accommodation, mechanical workshop etc.). Council services are routinely accessed by local residents and those visiting locally-based relatives.

The estimated resident population of the Pormpuraaw Aboriginal Shire is 731 persons (ABS 2014), 90.5% of whom identified as Aboriginal and/or Torres Strait Islander peoples. Overall PASC expenses[7] for the financial year ending 30 June 2015 totalled about $17M from a total revenue base of $16.4M. Expenditure on municipal waste management is factored into the budget. A tied grant of $89,774 for an up-grade of the solid waste landfill was received by PASC from the state Department of Infrastructure, Local Government & Planning during the 2014-2015 financial year. A state assistance subsidy of $1,580[8] per person per annum applies for Pormpuraaw (a small remote township) via local government general purpose grants.

Electricity supply is provided by a remote Ergon diesel power generation plant located on the periphery of the Pormpuraaw township, with local parties indicating interrupted and irregular supply to be a major contributing factor to a local high whitegoods turn-over, with a significant associated local hard waste disposal burden.

Municipal Waste Management

PASC maintains an existing landfill site, divided into discrete disposal areas, located within a fenced, lockable enclosure, compartmentalising general municipal waste and waste generated by bulk contractor operations or local infrastructure development (Map 3, p 8). The general municipal waste disposal area is located towards the front of the compound, the bulk deposal facility at the rear within a discrete lockable area. A medium sized roofed block structure, fitted with a stand-alone operational fire hose, allows for the safe storage and on-site separation of certain hazardous waste (waste oils, chemicals / paints, car batteries). General waste is separated into specific signposted areas.

In 2014/15 PASC completed a major waste facility upgrade (the aforementioned tied grant of some $90,000) to fully fence the landfill site with lockable gates, install terms of use signage, erect the bunded hazardous goods storage building, install operational surveillance cameras for misuse detection, separate and fence off the public access drop off area from the bulk waste storage area and undertake major bunding renovation earthworks to mitigate the impact of regular seasonal inundations affecting the immediate township vicinity. This was made possible with funding assistance from the Queensland Government brokered between responsible PASC staff (CEO, Environmental Manager, Operations Manager) and senior agency staff (former Dept. of State Development, Infrastructure and Planning).

The PASC Annual Report 2014-16[9] states that the Council aims to operate the local waste facility in line with the *Health Act 1937* (Qld) and the *Waste Reduction and Recycling Act 2011* (Qld), and that PASC has also installed surveillance cameras at the local waste facility with the aim of educating the community and improving waste management across the community as a whole. Fees are imposed by the council for certain disposal activities at the landfill waste facility, including processing and inspection, clean up, commercial dry waste (for various load and tonnage sizes); end-of-life car bodies and waste incineration services. General services levies (including waste disposal) apply for residential and commercial premises excluding social housing, comprising the majority of all residences in the community.

[7] *Pormpuraaw Aboriginal Shire Council Financial Statements for the year ended 30 June 2015* - http://www.pormpuraaw.qld.gov.au/financial.htm

[8] Local Government National Report 2013-14, Department of Infrastructure and Regional Development, Australian Government http://regional.gov.au/local/publications/reports/index.aspx

[9] Pormpuraaw Aboriginal Shire Council Annual Report 2014-2015 http://www.pormpuraaw.qld.gov.au/planning.htm

PLSM Rangers manage the removal of general and other waste from designated seasonal camping areas, including in remoter areas of the Shire. Illegally dumped rubbish including bulk items is a problem in certain areas of the Shire, particularly areas where illegal entry takes place on a repeated basis. Routine repeat offenders are known to the community, however enforcement challenges remain significant. From time to time community clean-ups are held in partnership between Pormpuraaw State School and Tangaroa Blue. These activities engage the Pormpuraaw Junior Rangers as part of the PLSM ranger program.

PASC garbage runs are maintained routinely and take in all township residents, public use areas, local facilities and public services. This essential service is managed by the PASC Operational Manager who oversees the work program of designated Council staff and the routine functioning of sewerage and water services. Further to managing the PLSM ranger program, the Council's Environmental Manager also manages PASC staff providing local environmental health services (waste water sampling, food retail compliance and inspections) and animal management (domestic pet control, veterinary liaison).

Generally green waste is collected as required and requested, usually every second month using backhoe and body truck. Self haul waste in recent years has been minimal as PASC completes extensive pre-cyclone kerbside collection late each year. Green waste is routinely chipped and used for mulch by local residents or in PASC maintained parks and gardens. Council undertakes general pre cyclone clean-up each years, involving tree-lopping around residential dwellings as the community is in a high risk cyclone area.

PASC arranges for the periodic bulk recycling of waste steel which has to date included the removal and transfer of abandoned (end of life) vehicles, empty 200L fuel drums, old tyres, old pushbikes, fridges and fuel/water storage containers abandoned on river banks by commercial fisherman. Bulk waste concrete is periodically crushed with a contractor excavator and used as erosion control at the local boat ramp. Tyres are temporarily stored in a separate fenced area at the landfill site for future re-use. Bulk clean fill is stored within a fenced bulk waste disposal area located at the rear of the landfill. PASC is considering transfer of all future construction materials out of the community being built into construction tenders.

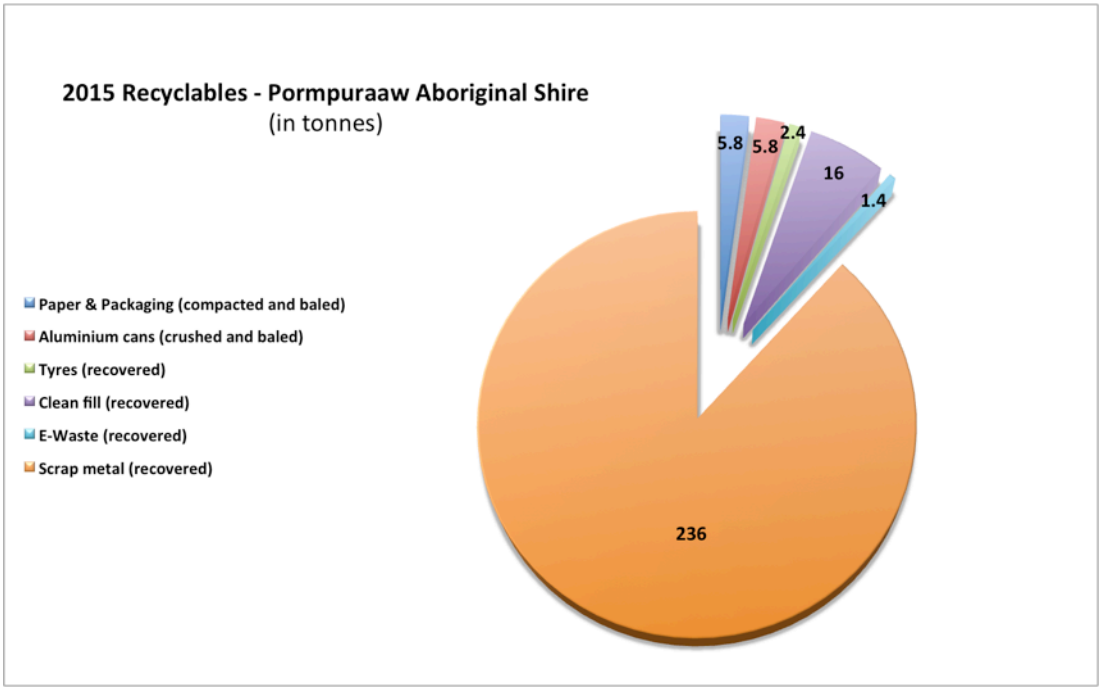
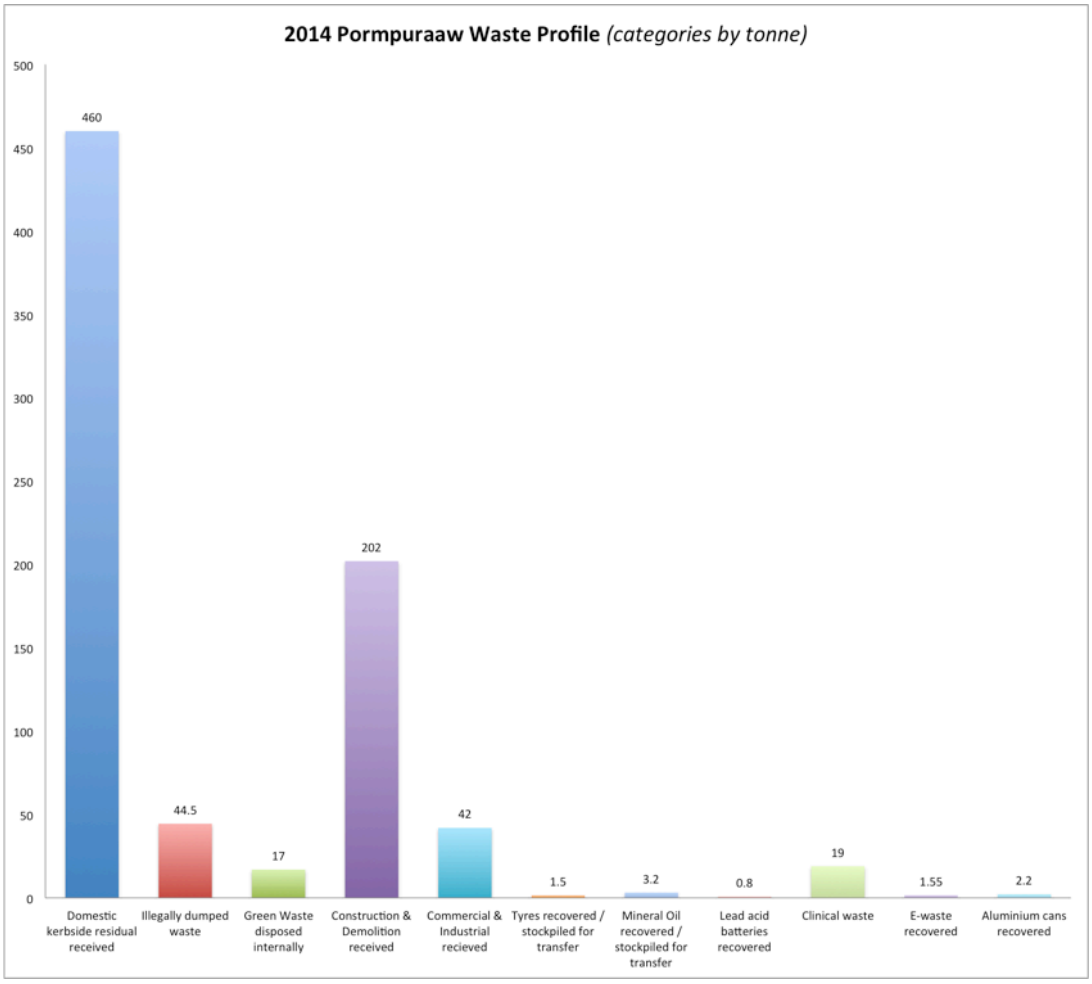


Figure 1 *above shows 2015 PASC Recyclables data (source: PASC)*



Figures 2 and 3 *show respective 2015 and 2014 Pormpuraaw waste profiles (source: PASC)*

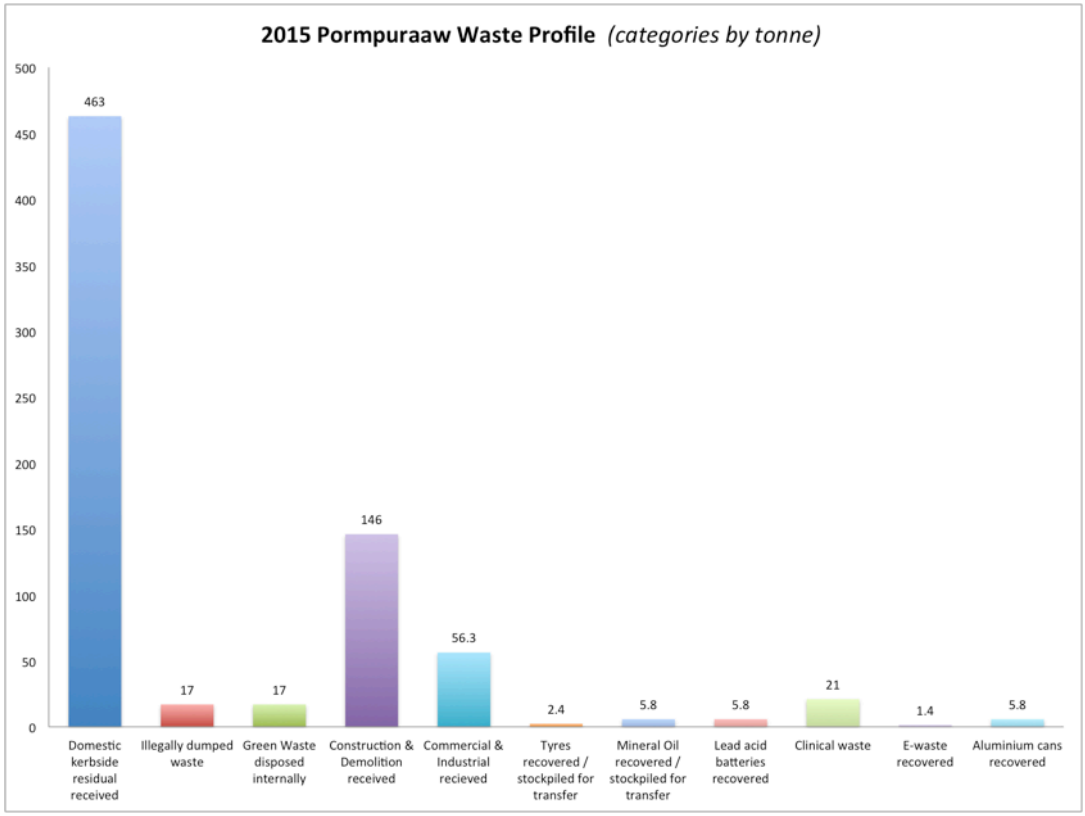
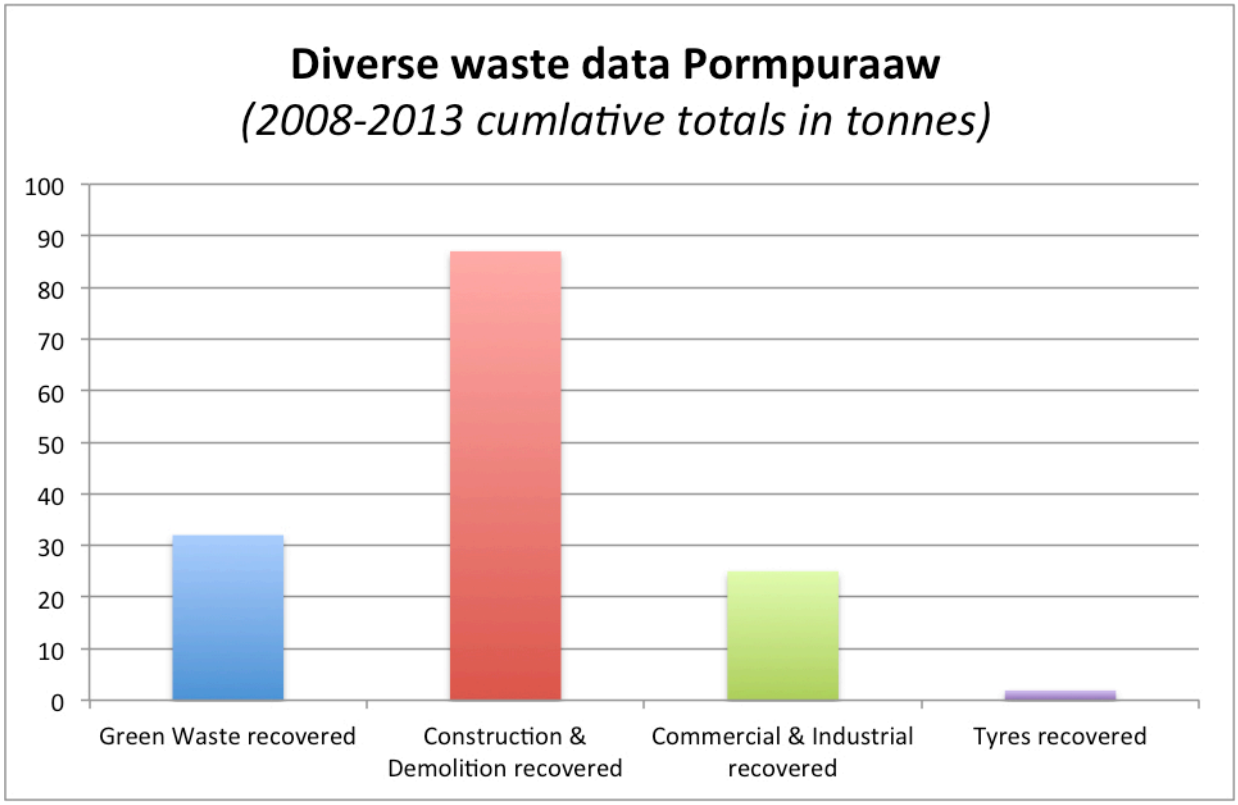


Figure 4 *below shows multi-year selected waste data (source: PASC)*



Large and unambiguous signage at landfill
Pormpuraaw Aboriginal Shire, Sept. 2016

Purpose-build hazardous waste shed
Pormpuraaw Aboriginal Shire , Sept. 2016

Compartmentalised landfill compound
Pormpuraaw Aboriginal Shire , Sept. 2016

Social club generated most container waste
Pormpuraaw Aboriginal Shire, Sept. 2015

Crushed and baled cans ready for transfer
Pormpuraaw Aboriginal Shire, Sept. 2016

Landfill must deal with very large volumes
Pormpuraaw Aboriginal Shire , Sept. 2016

PLSM Ghostnet removal on nesting beaches *© PLSM / PASC 2015*

Large art work created from recycled ghostnet and other waste materials *© Steven Kepper, PACCI 2016*

Authorised disposal of foreign illegal vessel *© PLSM / PASC 2014*

Marine Debris

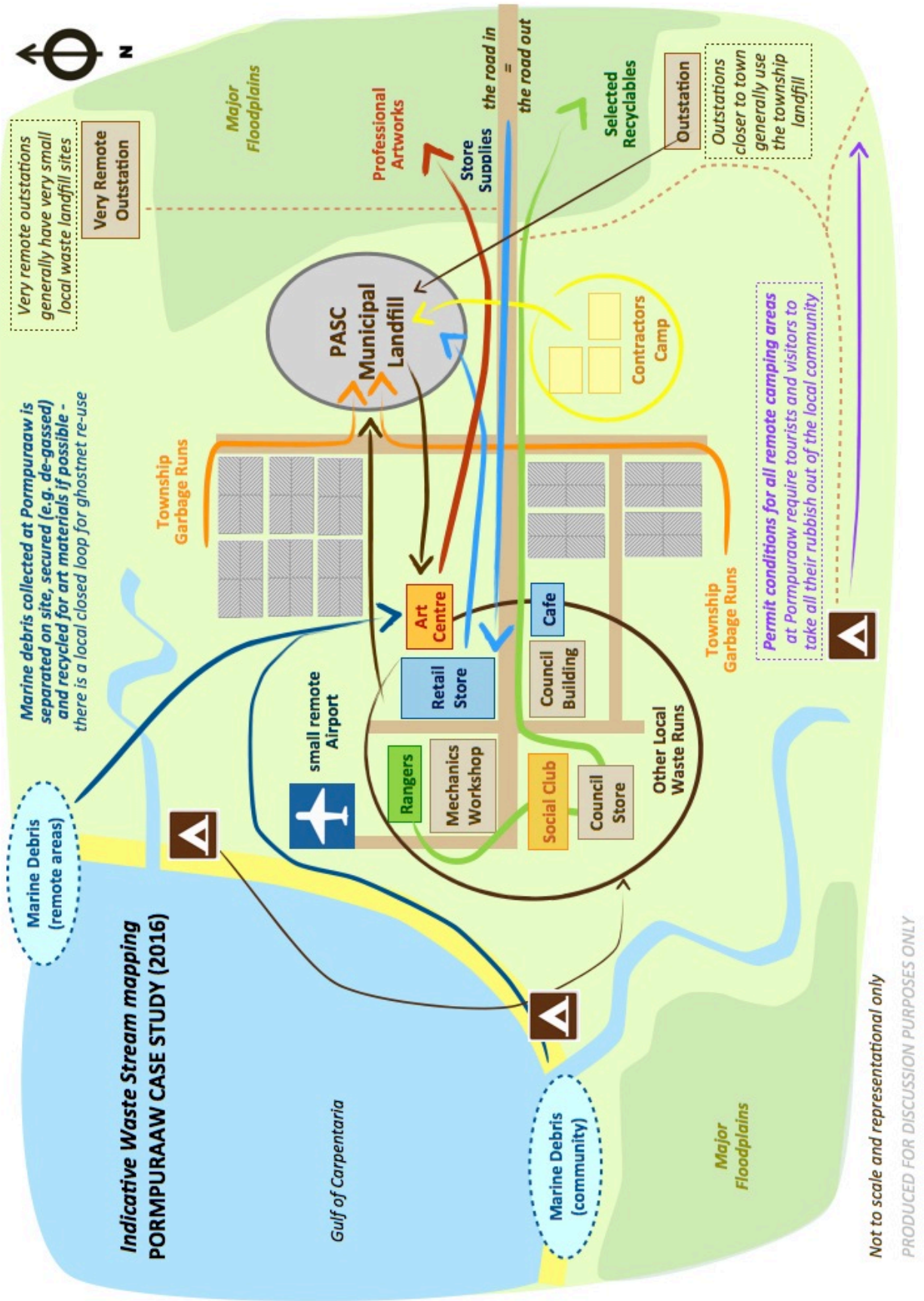
Marine debris does impact some beaches, coastal and estuarine areas of the Pormpuraaw Aboriginal Shire. PASC manages the priority removal of marine debris through the activities of the PLSM Rangers. Prioritisation of debris removal is presently not very high given the relatively lighter debris loads arriving onshore within the jurisdiction, and the extensive range of other, higher priority PLSM work plan activities. Marine debris removal in the Shire is resourced through the Western Cape Turtle Threat Abatement Alliance (WCTTAA) and through the Queensland Indigenous Land & Sea Rangers (QILSR) program, which presently underpins PLSM operations.

There is a local closed loop in the re-use of ghostnets by locally employed artists, all of whom are also TLOs. The Pormpuraaw Arts & Culture Centre Inc. (PACCI) is an independent community-owned organisation that runs the Pormpuraaw Arts and Culture Centre, where significant re-use of safe local waste materials occurs. Pormpuraaw artworks, including ghostnets specific artwork, is exhibited in Australia and internationally, is increasingly collected domestically and overseas, and attracts substantial sales. Prices are high, with local artwork in growing demand. There is now an acute local and regional shortage of ghostnet materials.

The PASC Environmental Manager stated that a higher volume of stranded ghostnets or other debris may arise in the event of a cyclone, particularly if it were severe or if there were several over a single season. Violent weather and very rough seas could easily loosen nets and ropes from submerged structures.

Marine debris clean-ups in the Pormpuraaw region are generally sporadically held (June 2012, May 2014), involving 76 volunteers for over 90 hours, collecting 2,205 individual items (totalling 18.5 bags) and weighing some 80kgs. This data comes from two sites very close to the Pormpuraaw township (*Rirranth* the Chapman River mouth and *Manroopa* the Mungkan River mouth). About 49% of all collected marine debris originated from land-based sources with about 51% identified to be of marine origins.

Indicative Community Waste Stream Mapping - Pormpuraaw 2016



Pormpuraaw Community Waste Stream Poster

Problem 1: Illegal dumping in remoter areas of the Pormpuraaw Aboriginal Shire

Illegal dumping by commercial fishing licensees operating in local waters, and to a lesser extent by recreational fishers accessing the Shire, remains a costly problem for PASC and PLSM in dealing with dumped waste, in particular its removal from very remote, ecologically sensitive regions. In the period 2014 to 2015 commercial fisherman accounted for almost all illegally dumped waste. Local hot spots include estuaries, river mouths and the lower reaches of local waterways. Major items of concern include refrigeration gas containers, steel bottles and discarded plastic bags.

PLSM works with Commonwealth customs and quarantine agencies to monitor illegal international fishing vessels and activities in local offshore waters, and at times are tasked with destroying stranded or abandoned vessels to contain related biosecurity risks.

Problem 2: Implementing a locally viable container refund scheme

The Alcohol Management Plan (AMP) for the Pormpuraaw Aboriginal Shire presently has a zero carriage limit (alcohol is prohibited). However the Pormpuraaw Brothers Social Club is licensed to operate as a canteen during weekdays for regulated hours for restricted direct alcohol sales (no take away alcohol). The closest external restricted sales point for alcoholic beverages is the roadhouse at Musgrave (220kms).

Within Pormpuraaw, aluminium can waste is currently generated from a small number of local retail outlets (and from the local consumption of illegally obtained alcohol or 'sly grog'). Local volumes of waste containers produced on a daily basis (cans, plastic and glass bottles, poppers, tetra packs etc.) are significant as there is a very high consumption rate of soft drinks and bottled drinking water.

The social club at Pormpuraaw demonstrates the production of very large amounts of local beverage container waste (exclusively aluminium cans). The opportunity to recover the vast majority of beverage containers from such an enterprise exists and is being pursued through opportunistic but fairly regular crushing and baling of cans. Whilst this recycling is to be undertaken by social club staff as part of their work duties, in reality the compacting and baling work is mostly done by PLSM Rangers (who are not tasked with recycling per se in their workplans). Improved coordination, capital for higher volume plant and extra human resources are required to turn current efforts into a long-term viable local recycling arrangement.

Support for effective local coordination during 2017 will clearly benefit the introduction of a container refund scheme in 2018.

Problem 3: Meeting the requirements of increased municipal compliance

Regulatory requirements in terms of environmental compliance, workplace health and safety and technical compliance of waste management facilities are considered to be onerous and difficult to manage given the general operating constraints impacting PASC as a remote Indigenous local government authority. Local parties state that meeting compliance requirements is extremely costly in terms of time, staff resources, skills development and training capacity. Further e-surveys (such as those used for QWDS data entry and reporting) can be problematic in very remote areas with inadequate internet connections.

Problem 4: Retail waste

The retail environment at Pormpuraaw is limited with two local retail outlets only for general food supplies (groceries, frozen and dry goods) and consumables (manchester, household supplies etc.).

The main retail store is operated by the Retail Stores Branch (RSB), a government owned corporation which is independently operated by its own Board, chaired by the Department of Aboriginal & Torres Strait Islander Partnerships (DATSIP). Freight into the community for trading stock to supply the Pormpuraaw Retail Store (foodstuffs, drinks, whitegoods, furniture, small electrical) was estimated to be in the order of 380,000kgs (380 tonnes) for the financial year ending 30 June 2016[10].

Due to the nature of the Gulf of Carpentaria and local waterways in this area, no barge operator services Pormpuraaw. Freight routinely arrives by road transport, with RSB retail freight predominately bought in by Hawkins Transport from Brisbane and other bulk stores and supplies also delivered by Tuxworth & Woods. During the wet season limited essential supplies can be flown in from externally located suppliers. Map 2 illustrates selected transport networks servicing remote communities across CYP.

The Pormpuraaw Retail Store operates an in-store baling machines that processes cardboard/ carton waste and plastic wrapping waste, as either mixed or separated bales. The baler produces a cubic metre (m^3) bale. Balers were adopted as a direct strategy by RSB to reduce the frequency of store staff trips to local landfills to dispose of this waste material. Compaction of waste cardboard is seen as a positive for store income streams: no cost and potential for income from recycling if the material can actually be recycled. Baled cardboard is not recycled further locally at this time. Transport logistics remain a significant constraint.

RSB has conducted research in cardboard recycling through Visy and similar recycling industry operators (about 3 years ago) which indicates private recycling operators are highly selective about what they will accept – e.g.: Visy will only accept un-waxed cardboard without any plastic. Indicatively the RSB research may point to the fact that presently recycling does not appear to be a viable income stream for the remote collection and re-processing of cardboard.

RBS has a policy of contractually requiring all contractors to remove their wastage when providing services to their remote retail stores – regardless of whether a job involves refurbishment or replacement of plant and equipment. This is a particular effort in terms of reducing the burden of old or obsolete commercial refrigeration units and associated toxic or dangerous gassing components on remote landfill. Retail store shelving and equipment to be replaced is offered to local organisations (social club, PASC) who may selectively accept this material for local re-use.

The authors spoke with the (non-locally based) manager of the Pormpuraaw Anglican retail shop, employed by the Anglican Diocese of North Queensland (Anglican Diocese NQ) who also own a similar small shop in Kowanyama. No other Anglican Diocese operates any other remote stores in Queensland.

The manager[11] stated that the Anglican Diocese NQ owned stores at Pormpuraaw (and at Kowanyama):

- Do not undertake any in-store recycling at present – unseparated waste is disposed at landfill.
- Will follow local council policies re recycling and waste disposal.

[10] *Personal communications* Eoin Quinvilan, Director of Retail Stores, Retail Stores Branch, DATSIP 17 October 2016
[11] *Personal communications* Maya Reddy, Manager of Remote Community Stores, Anglican Diocese NQ 23 November 2016

- Provide a bin outside each shop to encourage consumer litter disposal.
- Are strongly of the view that education will need to be a key feature of any recycling program.
- Are open to being involved in locally coordinated recycling.
- Weren't aware that a state container refund scheme was under discussion for imminent adoption.
- Consider the placement of container return infrastructure to be a matter for local councils, as land is leased from councils and not directly owned by the Anglican Diocese NQ.
- Strongly feel recycling which generates a cash return should pool refunds locally for community.
- Prefer to be consulted face-to-face during periodic visits to the community (for any potential brokered local coordinated recycling initiative, including container refund scheme development).

Problem 5: Coordinating local transfer and recycling efforts

Pormpuraaw is the only case study community presently engaged in semi-structured recycling. The materials being actively recycled are aluminium cans sourced from the social club, the interim safe storage and transfer of other recyclable waste and a closed loop locally for the re-purposing of ghostnet, marine debris and other locally re-purposed waste materials for professional artworks. The effective local brokerage and coordination of integrated recycling at Pormpuraaw is seen as a critical gap

Efforts are largely attributable to the dedication, commitment and drive of a small number of locally-resident individuals, including the current managers of PASC's environmental, operations and stores divisions, local artists and PACCI. However, all involved individuals must carefully balance the amount of time, effort and human resources they expend on recycling, as none of them are directly engaged or delegated by PASC (nor by PACCI) to coordinate or broker community-wide recycling. It is clear through the research conducted with local participants and informants for this project that there is genuine goodwill and interest in improving the efficiency and regularity of recycling, including the expansion of recycling activities and the establishment of locally viable container refund arrangements. There is also a real desire to share those approaches adopted and lessons learnt locally with other remote CYP Indigenous communities.

PASC staff store some wastes for periodic fee-for-service transfer to various recyclers for re-processing:

Waste oils:
- stored in bunded structure (PASC landfill) or collection barrel at PASC Storehouse
- transferred as required by a contractor to a MRF in Cairns
- re-processed at the MRF (Newport Recycling)

E-Waste:
- accumulated e-waste (electronic waste) is stored in a locked shipping container
- transferred as required to a MRF in Cairns
- re-processed at the MRF (Sims Recycling Solutions)

End-of-life cars:
- trailed a surrender scheme ($200 for each wreck paid from PLSM own funds)
- mobile car crushing plant contracted to travel to Pormpuraaw to crush/bale stockpiled vehicles (only feasible with larges volumes e.g.: >100 vehicles)
- transferred as required to a MRF in Brisbane
- re-processed at the MRF (Zebra Metals Gracemere)
- income from recycled scrap metal refunds initial surrender outlay (~$30,000)

Lead Acid batteries:
- stored in bunded structure (PASC landfill) or on pallets at PASC Storehouse
- transferred as required by a contractor to a MRF in Cairns
- re-processed at the MRF (Newport Recycling)

The ultimate test: Is it a community priority?

A [non-recycled, discarded plastic] bottle is going to be 10, 100, 1000, 1 million pieces.[12]

This project's research findings indicate that optimum local pathways to mitigating the increasing waste burden generated by growing remote communities and growing visitation by others to remote CYP is to invest in strategic cross-regional brokerage, collaborative partnerships, standardised infrastructure and appropriate technology options that can assist in creating as many locally closed or regionally aligned loops for best practice waste disposal and recycling as possible:

a) By initially investing in new or used capital equipment to establish an integrated array of local recycling operations, supported through community-wide coordinated recycling and locally tailored education programs focused on waste reduction / waste mitigation / recycling;

b) By reducing landfill burdens as much as possible through clearly signed and well managed source separation of transferable / recyclable / other waste and continuous operation of local recycling;

c) By regulatory agencies pro-actively assisting private industry to support and appropriately inter-face with remote community recycling streams to supply regional waste recycling operations and/or enhanced bulk recycling transfer options; and

d) Subsequently transitioning to ideal longer-term solutions such as waste bio-gasification systems or modern waste incineration equipment which delivers small amounts of fly-ash and maximises the retention of recyclable materials (glass, steel etc.) at whole-of regional-waste catchment scales.

As a start this project has:

a) circulated a local waste newsletter;

b) developed a draft suit of tailored local Waste Reduction Plans;

c) liaised with local parties to establish mobile phone recycling arrangements (ink cartridges are already being recycled through PASC);

d) liaised with recycling and transport operators to identify additional local opportunities: and

e) provided examples of new or used recycling plant, partly already used in case study communities.

Local Waste Reduction Plans

An indicative local waste stream map and visual community education poster (see above) were developed as an outcome of research field trips conducted with local parties in September and October 2016. Waste Reduction Plans (WRPs) were also developed for the Pormpuraaw community, using adapted Source Reduction Plan templates[13] developed by Tangaroa Blue. Community education materials and WRPs are at draft status only and have been provided to PASC for further consideration, finalisation and/or adoption.

- Illegally Dumped Waste
- A viable container refund scheme at Pormpuraaw
- Packaging Waste coming into Pormpuraaw
- Coordinated Recycling at Pormpuraaw
- Marine Debris on Pormpuraaw's Beaches

[12] *Personal communications* Heidi Taylor, Coordinator and Founder Tangaroa Blue Foundation October 2016

[13] Tangaroa Blue Foundation Source Reduction Plan templates are at http://www.tangaroablue.org/resources/source-reduction-plan.html

The advantages of investing capital and capacity into remote recycling in the short-term significantly outweigh the medium-long term implications of not doing so. Remote recycling directly assists in:

- better managing compliance and reducing litter and littering;
- maximising transfer of waste materials and pre-purposing of waste into renewable resources;
- building local foundations for remote area waste minimisation and resource re-use;
- supporting local recycling enterprises, employment growth and technical skills development;
- securing supply for existing and emerging commercial recycling opportunities;
- protecting biocultural values, traditional knowledges, spiritually and culturally significant places;
- maintaining scenic and other cultural amenity; and
- giving effect to product stewardship programs

A perceived disadvantage may be the associated financial establishment costs, operational requirements and human resource investments. Optimum outcomes, options for locally viable solutions and associated costings are detailed further below.

Towards solving Problem 1: Stronger local compliance and enforcement powers

1.1. Instigate specific local fisheries regulations and restrictions through Qld Fisheries (Department of Agriculture, Fisheries and Forestry) as part of current *Fisheries Act 1994* (Qld) review processes

1.2. Optimise relationship with Fisheries patrol officers, Biosecurity Queensland and Biosecurity Australia, including fee-for-service remote patrols and remote surveillance services

1.3. Optimise coordination between PASC management and Environmental Health Workers

1.4. Secure ongoing investment in building land and sea management capacity and resources

The general framework for delegation exists through the legislated role of Queensland local governments to do *anything that is necessary or convenient for the good rule and local government of its local government area, so long as it is something the State can validly do.* Fisheries compliance and enforcement powers are able to be delegated under the *Fisheries Act 1994* (Qld) to authorised officers. Similar powers to appoint authorised officers are embedded into the more recently enacted *Biosecurity Act 2014* (Qld).

Significant additional resources would be required to improve current local efforts to address illegal dumping, including the capacity to effectively address the dumping of commercial fisheries waste at sea and the illegal dumping of waste generated by commercial operators and recreational fisheries on land.

Serious efforts would need to be made by fisheries and biosecurity regulatory agencies to devolve well-resourced, meaningful compliance and enforcement powers to locally-based authorised officers. Full prosecution of fisheries offences must be backed up with effective fines and penalties, including formal asset seizures, enforced mother-ship de-registration and the removal of licences, including those with associated “roaming” rights. Identified repeat offenders impacting this Shire are well known to authorities and to locals, and are routinely threatening when approached by locally authorised officers.

Towards solving Problem 2: Effective brokered, coordination for local container refund scheme

2.1. Provide specific culturally effective education focused on recycling

2.2. Secure immediate resources for effectively brokered local coordination through PASC

2.3. Secure extra resources to acquire, maintain and operate larger capacity recycling equipment

2.3. Pro-actively engage all local retailers

2.4. Implement a locally tailored container refund scheme

2.5. Investigate the potential for local recycling facilities to operate as a small enterprise

Tangible and direct benefits to the local community:

- Removes recyclable resources out of the local waste stream and out of remote landfill sites
- Improves local environmental health for our remote Indigenous community
- Reduces pollution and contamination of township areas including residential houses and yards
- Reduces pollution threat to waterways which supply local subsistence foods
- Extends the life of landfills managed by PASC
- Expands potential to follow through on national Product Stewardship programs
- Addresses aspects of *Closing the Gap / Overcoming Indigenous Disadvantage*
- Coordinated local recycling effort / regular transfer of separated waste to external processors
- Builds capacity for local container refund scheme implementation
- Stimulates local recycling enterprise development over time
- Separated wastes can be better managed on-site, including periodic on-site shredding or compaction (pending securing of capital for a small local recycling plant and infrastructure)
- Employs local people to man staffed landfill and resources better source separation at landfill

Towards solving Problem 3: Flexibility in adapting compliance requirements to local constraints

3.1. Work with State agencies to streamline mandatory waste reporting requirements

3.2. Clear, unambiguous (not duplicated) decision-making within PASC operational structures

3.3. Lobby for more effective technical support for remote councils (Cape Indigenous Mayors Alliance, Indigenous Leadership Group, local members of parliament)

3.4. Ensure waste management facility infrastructure and areas are factored into local agreements including any relevant Indigenous Land Use Agreements (ILUAs)

Towards solving Problem 4: Mitigating or reducing retail packaging waste

4.1. Provide specific culturally effective education focused on recycling

4.2. Implement a locally tailored container refund scheme

4.3. Acquire industrial baling machines capable of processing cardboard and paper

4.4. Introduce a ban on single use bags

4.5. Consider new local government retail packaging rules or policies in consultation with local retailers

4.6. Encourage local retailers to mitigate or reduce retail and bulk packaging waste

4.7. Discuss with RBS related retail practice changes which may require RBS internal policy change

Tangible and direct benefits to the local community:

- Reduces pollution and contamination of township areas including residential houses and yards
- Reduces pollution threat to waterways which supply local subsistence foods
- Extends the life of landfills managed by PASC
- Expands potential to follow through on national Product Stewardship programs
- Coordinated local recycling effort and regular transfer of separated waste for recycling down south
- Separated wastes can be better managed on-site, including periodic on-site shredding or compaction (pending securing of capital for a small local recycling plant and infrastructure)
- Recycled cardboard and bubble wrap can be used by local organisations (arts centre or school)

Towards solving Problem 5: Resources for brokered local coordination

5.1. Provide specific culturally effective education focused on recycling

5.2. Pro-actively engage all local retailers

5.3. Implement a locally tailored container refund scheme

Tangible and direct benefits to the local community:

- Removes recyclable resources out of the local waste stream and out of remote landfill sites
- Improves local environmental health for our remote Indigenous community
- Reduces pollution and contamination of township areas including residential houses and yards
- Reduces pollution threat to waterways which supply local subsistence foods
- Extends the life of landfills managed by PASC
- Expands potential to follow through on national Product Stewardship programs
- Addresses aspects of *Closing the Gap / Overcoming Indigenous Disadvantage*
- Coordinated local recycling effort / regular transfer of separated waste to external processors
- Builds capacity for local container refund scheme implementation
- Stimulates local recycling enterprise development over time
- Separated wastes can be better managed on-site, including periodic on-site shredding or compaction (pending securing of capital for a small local recycling plant and infrastructure)
- Employs local people to man staffed landfill and resources better source separation at landfill

Summary of Pormpuraaw specific findings (Table A)

Marine Debris	*Municipal Waste Management*
• Marine debris and ghostnet removal is routinely undertaken by Pormpuraaw Land & Sea Management Rangers (all of whom are employed by PASC). • Marine debris is increasingly observed to originate from domestic vessels (eg: Australian sourced empty oil and lubricant containers, plastic water bottles, broken fishing gear, storage containers, litter), as well as from other (foreign) ocean-going fishing vessels. • Illegal dumping by commercial fishing operators (and others) remains a costly problem for PASC and PLSM, in particular its removal from very remote, ecologically sensitive regions. • PLSM works with Commonwealth customs and quarantine agencies to monitor activities. • Local hot spots for marine debris include estuaries, river mouths and the lower reaches of local waterways. Major debris items of concern include refrigeration gas containers and steel bottles. • Ghostnet numbers arriving on the Shire's coastline have fallen in recent years - possibly due to a lack of recent cyclones and international reduction-at-source efforts, in particular in Indonesia. • Not many entanglements are observed locally. • Ghostnets, marine debris and other waste are important resources for locally employed artists.	• Landfill sites operations are improved by having clearly delineated areas for separated mass contractor-generated waste (Commercial & Industrial (C&I), Construction and Demolition (C&D) and for separated general community waste (MSW). • Maintaining on-site separation definitively assists in extending landfill lifespans, and pooling potential recyclables for local re-use and/or periodic processing for back-loading. • Back-loading of priority toxic waste and recyclables is achievable if well targeted and locally arranged with transport operators servicing an area. • All-weather storage for recyclables is required to amass viable back-load volumes over time. • Selected recyclable materials are collected, appropriately stored and transported (or backloaded) by contractor to privately operated Cairns or other southern MRFs. • PASC will not accept asbestos in the municipal landfill, with contractors engaged by QBuild as required for demolition / removal of asbestos • Clinical waste is collected five (5) times weekly and incinerated in a separate pit at landfill site • PASC receives no hazardous chemicals, as there are no local industrial activities • Reduction in single use plastic bags achievable where in-store alternatives are made available. • High attrition rate of 'wheelie-bins'. • Retail store cardboard waste is sorted, compacted, baled and removed to landfill. Staff are trained in these procedures. • Some waste types (e.g., tyres and concrete) are stockpiled for potential future reuse by PASC. • PASC consistently receives waste disposal fees from contractors working within the Shire. • PASC is considering new contract conditions requiring contractors to dispose all waste external to the Pormpuraaw Aboriginal Shire.

Table A

Summary of key case study discussion points (Table B)

Identified priority issue	*Brief description*	*Potential solution/s*	*Comments*
Illegal dumping *Local Waste Reduction Plan developed for this issue*	*Rubbish, debris, hard and hazardous waste discarded by illegal visitors and others in remote, seasonally inundated areas*	– Secure stronger local compliance and enforcement powers – Lobby for improved regulatory agency support for local authorised officers - Flexibility in adapting compliance requirements to local constraints	*Commercial fisherman accounted for almost all illegally dumped waste*
Implementing a locally viable **Container Refund Scheme** *Local Waste Reduction Plan developed for this issue*	*Setting up local container refund scheme implementation scheme during 2017 for proposed 2018 commencement of State-wide container refund scheme*	- Provide culturally effective education - Secure resources for effectively brokered local coordination - Pro-actively engage all local retailers - Implement a locally tailored container refund scheme	*PASC currently supplies large mesh cages at social club (pub) for empty aluminium cans, which are picked up by PASC / PLSM staff (ideally social club staff) and taken to small makeshift recycling shed where they are crushed and baled for periodic bulk transfer to a Cairns based MRF for re-processing*
Meeting the requirements of **increased municipal compliance**	*Onerous compliance burdens and reporting requirements for small remote landfill sites*	- Streamline waste mandatory reporting requirements - Clear, unambiguous (not duplicated) decision-making - Lobby for effective technical support for remote councils	*Recent landfill upgrade (cost ~$89,000) brings PASC facility up to remote compliance standards* *Flexibility in adapting compliance requirements to local constraints may be required in State regulatory frameworks*
Retail waste *Local Waste Reduction Plan developed for this issue*	*Waste generated through day to day consumption, including single use plastic bags and other plastic packaging*	- Implement a locally tailored container refund scheme - Acquire industrial baling machines capable of processing cardboard and paper - Introduce properly biodegradable single use bags	*Pormpuraaw Retail Store uses a commercial baling machine to compact cardboard, which is then disposed of at the landfill, however this is not available for general use* *Retail practice change will require RBS policy change and State Government regulatory changes*

Identified priority issue	*Brief description*	*Potential solution/s*	*Comments*
		- Consider new local government retail packaging rules - Mitigate or reduce retail and bulk packaging waste	
Coordination of local transfers and recycling *Local Waste Reduction Plan developed for this issue*	*No current separation of kerbside garbage takes place* *At the local level better coordinate enhanced collection, all-weather storage and effectively timed transfer of recyclables by to identified MRFs in southern centres*	- Continue to facilitate periodic transfers out of community for all recyclables and hazardous wastes, in particular prior to each wet season - Safely stockpile other bulk recyclables for periodic on-site compaction and transfer out to recyclers (e.g.: end-of-life vehicles) - Implement a locally tailored container refund scheme - Secure resources to acquire, maintain and operate larger capacity recycling equipment - Establish a separately resourced (new) Council position to broker and coordinate cross-community recycling	*PASC stores waste oils and transports to Cairns as required by a contractor to an external MRF (Newport Recycling Cairns Qld)* *Lead Acid batteries are stored in the new hazardous goods bunded storage building and are transported by contractor to an external MRF (Newport Recycling Cairns Qld)* *PASC stores accumulated e-waste (electronic waste) and periodically arranges for its safe transport and disposal to an external MRF (Sims Recycling Solutions Cairns Qld)* *In 2015 PASC financed a mobile car crushing plant to travel to Pormpuraaw and crush/bale a 15 year stockpile of 123 vehicles (Zebra Metals Gracemere Q www.zebrametals.com.au)*

Table B

Best practice options – what might they look like?

Best practice - locally coordinated recycling and regional industry incentives to complement emerging state-wide regulatory recycling schemes

Container deposit / refund schemes are proposed to be introduced in New South Wales during 2017 and in Queensland during 2018. The next 12 months will be critical for regulatory agency engagement with remote Indigenous communities to develop complementary local and regional arrangements which do not disadvantage remote Indigenous communities from sharing the benefits associated with such schemes: significantly reduced litter and marine debris volumes, related enterprise development potential / remote Indigenous employment growth, improved environmental health outcomes and local income generation.

The Queensland Container Deposit Scheme Advisory Group has the role of initiating discussions and facilitating dialogue with all stakeholders in the development of the proposed Queensland scheme. The Group is also charged with investigating potential regulatory changes regarding single-use plastic bags[14].

The proposed scheme has a number of clear initial objectives:

> Objective 1 – Reducing the litter impact from beverage containers in the away-from-home context.
>
> Objective 2 – Improving resource recovery, especially in regions, and providing benefits to jobs and the economy.
>
> Objective 3 – Enhance social benefits by encouraging community-based enterprises to participate in the scheme.

The Group's website details the scheme's recommended design principles, namely that the scheme must:

- Cover the whole state to ensure all Queenslanders have the opportunity and ability to recover their beverage containers – regional arrangements are necessary.
- Be cost-effective with minimal cost to the Queensland community.
- Be straightforward and convenient to use while providing public education and awareness and approaches to encourage participation.
- Recognise the potential financial and resource recovery impacts on existing recycling services and present opportunities to mitigate these impacts and minimising duplication of existing recycling infrastructure.
- Be flexible and responsive with ability to improve and adjust over time if circumstances change.
- Provide transparent mechanisms for accountability, including the ability to easily track the flow of monies and the quantities of recovered and recycled containers and materials.
- Provide clear and efficient governance arrangements.
- Consider other national and state packaging initiatives by government and industry either in place or proposed.
- Recognise the potential commercial impacts associated with a scheme.

[14] https://www.ehp.qld.gov.au/waste/container-deposit-scheme.html accessed July, September, October, November and December 2016

- Be designed to prevent fraudulent behaviour.
- Utilise different collection methods to suit local circumstances and provide opportunities for multiple participants and beneficiaries.
- Have legislated features (eg. refund amount, container scope, container approval and labelling requirements and governance arrangements) to provide an enduring arrangement.

Discussions with CSC indicate there is clear potential to build recycling industries in the medium term which utilise recyclable resources extracted from CYP, but that these must be underpinned by regulatory recycling initiatives and incentives, backed up by coordinated local remote community recycling which can provide consistent payloads for private industry operators, and a useful monetary return for remote communities[15]. Remote regional councils in Australia's north are also increasingly developing waste reduction strategies[16].

Thus key coordinating entities which support the selected CYP case study communities like the Cape Indigenous Mayors Alliance and the Indigenous Leadership Forum are considered essential partners in strengthening and scaling up remote recycling across the region. Regulatory agencies will also need to be directly involved and coordinated into a regionally effective and well-integrated network to support recycling including locally viable container refund scheme arrangements.

Local coordination needs to consistent and dedicated over time. The experience of the Warraber Island Waste Pilot clearly demonstrates that substantial capital investments require sustained local government commitment to remain operative over time. It is acknowledged that the Torres Strait region is subject to special circumstances: e.g.: very restrictive quarantine regulations, very dispersed localities within a single local government jurisdiction.

However, there are clear commitments required from local government to keep facilities such as the one established on Warraber Island operational, and there are further requirements for other levels of government to commit additional capital for human resources, capacity building, technical support and cross-agency coordination to keep remote facilities functional[17].

Advice from remote communities in the NT[18] who are engaged in recycling is that coordinated brokerage, over a collective of municipalities, can maximise the array of viable opportunities and alternative solutions. Several remote NT regional councils have come together with the NT Department of Health to resource a full-time coordinator whose role is to liaise between remote jurisdictions, regulatory agencies, transport companies and recycling industry operators to facilitate better waste management, integrated recycling and related outcomes in remote areas[19].

The position, which commenced some 6-7 months ago, has an initial annual budget of around $120,000 comprising nominal contributions from 3 remote regional councils (~$10,000 each) and a contribution of some $90,000 from the NT Department of Health. The success of the project to date, and the value the collaborating regional councils derive from the role, may see the project continued for a further 2 years to mid 2019 as a co-funded initiative resourced through two NT government departments. It should be noted

[15] *Personal communications* Alan Wilson, Deputy Mayor Cook Shire Council, 13 September 2016 and 27 November 2016

[16] For example the East Arnhem Regional Council 2015-2025 Waste Management Strategy (http://www.eastarnhem.nt.gov.au/waste-strategy/)

[17] *Personal communications* Mika David, Senior Environmental Officer, Torres Strait Island Regional Council, 21 November 2016.

[18] *Personal communications* Rob Drew, Council Operations Manager Kalkarindji Daguragu Communities within the Victoria Daly Regional Council jurisdiction, 2 December 2016.

[19] *Personal communications* Liam Harte, Coordinator Big Rivers Waste Management Working Group NT, 7 December 2016

that this role is separate to, and in addition to, remote Environmental Health Workers located in remote NT communities to improve Indigenous health outcomes.

The Wadeye community and the Kalkarindji / Daguragu communities are situated in the remote NT, at substantial distance from basic recycling facilities in Darwin, which can currently only process Container Deposit Scheme (CDS) recyclables. Other recyclers used to date by remote NT Indigenous communities are based in Brisbane or in Adelaide. Both communities have local recycling programs which link into the NT's CDS, with subtle differences in how these local recycling initiatives operate.

Table E provides a general overview of the aforementioned remote NT and Torres Strait recycling schemes.

Examples of remote recycling in the NT and the Torres Strait (Table C)

Community	*Type of Scheme*	*Current Status*	*Supported by*
Kalkarindji and Daguragu (NT)	Local community recycling scheme which feeds into NT CDS, run and managed by Victoria Daly Regional Council employed staff	Actively processing most local drink container waste (cans, plastic bottles) with regular transfers back-loaded out to recyclers. No direct monetary refund (benefit) to individuals. All collected refund monies go back into community.	Income generated from CDS refunds is directly re-invested into community e.g.: purchase of more recycling equipment or for priority community projects. *(Source: R Drew, 2016)*
Wadeye (NT) *Local population around 2,500 persons*	Local community recycling scheme which feeds into NT CDS, run and managed by Thamarrurr Development Corporation	Actively processing all local drink container waste (cans, plastic bottles, glass) with regular transfers back-loaded out to recyclers for free. Direct monetary refund paid by ranger program to local residents participating in the scheme. Making money for ranger program as they act as "middle men" and gain 2c extra p/item as well as the 10c refund they pass on. Looking to up-scale in terms of other recyclable items (soft plastics, scrap metal) and geographically (across smaller towns, outstations)	Run as part of the local Working on Country (WOC) ranger program. 1 Team Leader and 6 Indigenous rangers. Rangers are tasked with assisting community to access and bring waste to designated counting area on 1 day each week (Fridays). May handle up to 20,000 - 25,000 items a week. *(Source: Thamarrurr Development Corporation, 2016)*

Community	*Type of Scheme*	*Current Status*	*Supported by*
Warraber Island (Sue Island, Torres Strait) *Local population around 200 persons*	12 month pilot project with all aspects of best practice waste management including: - organic composting, - green waste, - recycling, - transfer of recyclables; and - non-landfill disposal. Was recycling some 85-90% of recyclables on Warraber Island.	No longer operating at capacity. No local resources currently available to responsible local government entity for facility operations or facility staff. Plant and equipment still there and reportedly only needs minor maintenance for sound working order.	Funded at $440,000.00 to establish pilot. No current funding. Funded as a one-off pilot project, with high level technical support and good community up-take. Achieved tangible benefits whilst operational *(Sources: M David, 2016 and Aurecon, 2011)*

Table C

Existing remote recycling effort in the NT and the example of the Warraber Island Waste Pilot clearly show that coordinated local capacity building requires direct capital and resource investments to establish and maintain. A failure to strategically invest in the short-term clearly has medium-term consequences for establishment costs. Conversely any remote recycling effort means a reduction in landfill waste volumes.

There are a number of discrete options for integrated scaled-up recycling at the remote regional scale, (although it should be noted that this area of technology is constantly evolving and rapidly expanding):

1. Bio digesters – potentially modular and scalable (dependent on system technology); expensive; requires operational volume of materials collected over a geographic region, technical maintenance and support
2. Thermal digesters – modular; scalable; proven in extreme / remote conditions overseas; expensive; requires operational volume of materials collected over a geographic region, technical maintenance and support: e.g.: Batch Oxidation System™ Thermal Gasifier (Canadian technology); Plastofuel™ which creates a solid fuel or Thermofuel™ which creates diesel (both from plastics).
3. Composite plastic recycling – an example of this is the Plasmar™ recycling process which creates a timber substitute: this material is used for fencing, access bollards, decking, pallets etc.
4. 3D printing technologies hold some potential for localised re-use of certain plastics, including ghostnet materials removed from remote beaches. However, it needs to be recognised that such processes create new plastic waste[20]. There is an internationally active research and development (R & D) community investigating materials use, technology and applications, e.g.: Circular Ocean (http://www.circularocean.eu/research/)

Research undertaken by GNA[21] has found that:

- Companies recycling plastic in Australia tend to mostly apply composite recycling technology;

[20] *Personal communications* Heidi Taylor, Coordinator and Founder Tangaroa Blue Foundation 26 October 2016

[21] *Personal communications* Riki Gunn, co-founder GhostNets Australia (GNA) 14 November 2016

- Some companies advised that ghostnets may not be suitable for certain recyclable processes (unconfirmed) as the material must be pelletised (plastic material shredded first then compressed) and apparently nets are unable to be shredded as they are too fibrous and clog up the machines.
- Recycling companies appear to be primarily interested in dealing with large and easy solutions (such as working with larger metropolitan councils for kerbside waste); and
- Companies were definitely not that interested in marine debris and related complications of waste transportation.
- All present recycling processes involve very large continual supply of raw materials.

Costs associated with advanced technologies are generally considered prohibitive, with the technical skills required for maintenance and up-keep also considered to be exceedingly rare and expensive to import on a needs basis. However, such equipment (e.g.: Thermal Gasifier) is being used increasingly in India and in very remote parts of industrialised nations, including in remote Indigenous communities in north America.

An initial list of selected Australian waste /mitigation reduction / recycling equipment suppliers, including some with demonstrated remote community supply experience, is at Appendix B. It is recognised that there are any more specialist retailers and technical support providers operating in the Australian market.

Wet waste compressor *image courtesy of Wastech Pty Ltd, 2016*

Multi-purpose shredder *image courtesy of Bentwood Recycling Systems, 2016*

Cardboard chipper *image courtesy of Bentwood Recycling Systems, 2016*

RamCan™ crusher / barer modified for remote use *© RamCan Pty Ltd, 2016*

Mobile crusher / baler in use, Kalkarindji NT *© R Drew and Kalkarindji community, 2016*

Recycling containers, Kalkarindji NT *© R Drew and Kalkarindji community, 2016*

Recommendations

Effective recycling of municipal waste and marine debris at Pormpuraaw will require pro-active local and regional brokerage, and locally co-ordinated recycling capacities which are well integrated with a developing regional recycling industry. Limited discretionary funding of small footprint activities will not result in long-term reductions of marine debris loads nor in mitigating remote municipal landfill challenges.

There is no current local capacity for any level of routine recycling (other than ad hoc effort) nor for that matter within the Cook Shire. Coordinated recycling is an immediate priority to extend the lifespan of the Pormpuraaw municipal landfill.

CSC advise that they will continue to investigate the potential to initiate an emissions neutral, renewable energy powered MRF in the region over time, with a short-term focus on the establishment of container refund scheme depots and the alignment of related transport and other logistical support arrangements across the CYP region[22]. Given the extreme transportation distances involved both between locations within the CYP region and to existing MRFs (exclusively located outside CYP), well-resourced brokerage of local and regional recycling, depot and transfer infrastructure development and facilitation of complementary arrangements will be essential for long-term operational viability for remote recycling and waste mitigation / reduction success in local communities and regionally.

Recommendations in relation to municipal waste:

1. **Experience in remote Torres Strait Islands and NT Indigenous communities demonstrates that local recycling works most effectively where permanent workers (not rotational employment program participants) operate all aspects of a local recycling program or community enterprise.**
2. **Reverse vending (passive automaton collection points) technology requires additional negotiated physical space within very limited retail floor space or public areas in all case study communities.**
3. **Passive schemes are not considered likely to generate the buy-in that a pro-active scheme would.**
4. **A locally coordinated scheme, which pro-actively brokers optimised remote recycling through immediate direct benefit incentives, is considered to be a sound working model – where it can be supported by ongoing investments in local Indigenous rangers (e.g. through WOC, IPA, QILSR or similar programs) and where it can effectively link into an operational container refund scheme.**
5. **There are now immediate opportunities to provide targeted resources to PASC and other CYP Indigenous local governments for the effective coordination of remote waste management and effective integration of locally recovered resources with emergent recycling industries, and specifically with an imminent State-wide container refund scheme roll-out during 2017 and 2018.**
6. **The Pormpuraaw community would benefit for a targeted immediate direct capital investment (indicatively in the order of $300,000) to optimise / adapt local waste infrastructure to maximise the community's potential direct benefits from the Queensland-wide container refund scheme.**
7. **In addition to such an initial direct capital investment into waste minimisation and recycling infrastructure and associated annual operational and maintenance costs (an indicative annual allocation of $130,000 per community at a minimum), culturally tailored educational campaigns and locally viable incentive schemes are required for inter-generational behavioural change.**

[22] *Personal communications* Alan Wilson, Deputy Mayor Cook Shire Council, 13 September 2016 and 27 November 2016

8. **Industry incentives are required to off-set prohibitive remote transportation costs for transfer or subsidised back-loading of recycled materials / resources and for any periodic on-site industrial compaction or shredding (e.g.: for scrap metal including end-of-life vehicles, tyres etc.) .**

9. **Optimum long-term solutions (e.g.: emissions neutral incineration at regional scale powered by renewable energy) are beyond the present financial and technical capacity of individual remote councils, and would require waste payloads coordinated across the greater CYP region.**

10. **The immediate future (2017 and 2018) presents an unrivalled opportunity to establish viable foundations for a well-integrated and brokered recycling effort engaging PASC, other CYP local governments and related decision-making forums including Cape Indigenous Mayors Alliance, the Indigenous Leadership Group and the Local Authority Waste Management Advisory Committee.**

11. **Solutions require investment into local brokerage and coordination efforts, locally tailored capital investments and informed regional-scale brokerage engaging all tiers of government.**

Recommendations in relation to marine debris impacting the Pormpuraaw region:

1. **In all case study communities, marine debris removal is seen as a potential route to employment or forms part of the operational workplan of an existing skilled and professional workforce (e.g.: land and sea rangers employed at Mapoon or Pormpuraaw, with Traditional Owner bodies etc.).**

2. **In all case study communities, existing effort / capacity to remove debris must be balanced with other, often immediate, competing demands for allocated professional or general resources.**

3. **Direct capital investment - to increase remote recycling capacity and to integrate this with emerging regional recycling capacity - is an immediate need in addressing environmentally sustainable and economically viable marine debris removal in remote areas of CYP.**

4. **Sustained well-resourced and well-coordinated effort demonstrably lowers the prevalence of debris and ongoing in-situ break up of debris into incrementally smaller bits, thus mitigating harmful impacts on vulnerable marine and terrestrial species, and human health and wellbeing.**

5. **Funding needs to be complementary (well-aligned) and not duplicated between various agencies, it also needs to be invested directly into proven on-ground efforts, not allocated to bodies without marine debris removal capacity or track-records (eg: statutory or regulatory agencies).**

6. **Addressing marine debris as an immediate and ongoing environmental management issue for remote Indigenous communities – particularly extreme loads prevail on eastern CYP beaches, beaches around the 'Tip' in the NPA region and on north-western CYP beaches.**

7. **Remote marine debris hotspots on CYP are either highly exposed or very difficult to remove bulk debris from. Action requires very significant resources and potential military logistical support.**

8. **CYP-wide marine debris loads are more extreme than anywhere else on the Australian mainland (although the area was excluded from recent surveys), with a WCTTAA-like arrangement considered to hold real potential for locally viability and achievement of region-wide impacts.**

9. **Sustained investment in local Indigenous Land and Sea Management capacity is a pre-requisite to reduce debris loads in the region, characterised by extreme remoteness and climatic conditions.**

10. **New regulatory incentives (e.g.: container refund schemes) and industry incentives (e.g.: fuel rebates, capital investment subsidies) will be required to maximise recycling of marine debris.**

Priority Issues and Potential Solutions (Table D)

Identified priority issue	*Optimal outcomes*	*Viable strategies for short-term adoption*
Illegal dumping in remoter areas of the Pormpuraaw Aboriginal Shires	**Less or no illegal dumping through behavioural change** **Reduced costs and overheads for remote councils in removing illegally dumped wastes**	• Establish or maintain land and sea management rangers or local government enforcement presence to monitor illegal dumping in remoter areas and collect direct evidence for prosecution of related breaches • Install / maintain behavioural and directional signage • Enforce contractual beaches involving illegal dumping • Ensure at least some PASC senior staff hold accredited enforcement and regulatory compliance powers • Develop and enact local laws with clear penalties for illegal dumping and waste disposal breaches • Develop strong relationships with enforcement agencies such as Fisheries, Police and Biosecurity
Marine debris on remoter beaches	**A substantive reduction in marine debris arising from implementation of container deposit schemes (or similar) and bans on single use plastic bags** **Well-resourced local land and sea management capacity**	• Maintain existing partnerships, to undertake regular paid marine debris removal and transfers for recycling, including the removal of ghostnets • Maintain and increase resources for locally active land and sea management in CYP remote communities and collaborate with them to extend fee-for-service work • Lobby with other CYP communities for an integrated, region-wide and well-resourced alliance of ranger groups to systematically remove debris (e.g.: based on the highly successful WCTTAA example) • Actively collaborate with and support local biosecurity efforts with in-kind resources, expertise and personnel • Resources allocated for regular marine debris removal on CYP, including in the Pormpuraaw Aboriginal Shire's remote coastal areas
Implementing a locally viable **Container Refund Scheme** **Drink container waste** (aluminium cans, plastics, glass, tetra packs)	**Local integrated recycling system - brokered, coordinated and fully operational** **Local recycling enterprises are operational**	• Brokerage of locally viable recycling / container refund scheme will be a necessary pre-requisite for up-scaling • Support full recycling of all store generated packaging (eg: part capital contribution to recycling equipment for plastics, cardboard shredding) • Participate in coordinated local recycling program, including a local container refund scheme • Engage PASC and all other local retailers early and fully in container refund scheme implementation for viability • Ensure full participation of all local beverage retailers

Identified priority issue	*Optimal outcomes*	*Viable strategies for short-term adoption*
Retail waste **Retail and bulk packaging waste** **Resourced and brokered local coordination**		• Maximise local coordination to minimise confusion about introducing local container refund arrangements • Centrally coordinate all local recycling arrangements, transfer schedules and communications where possible • Acquire and operationalize municipal council plant for local recycling (indicative set up, operational and maintenance costs in the order of $350,000) • Negotiate transport for recyclables to external MRFs • Build support for local recycling enterprise development • Require remote job service providers to routinely and effectively collaborate locally (not happening presently) • Specific public capital investment programs for remote community recycling are urgently required • Expanding Indigenous land and sea management programs will assist to address remote waste and debris • Resourcing ongoing technical skills training for best practice remote community recycling will be essential
Meeting increasing municipal compliance requirements		• Work with regulatory agencies to develop plain English guide for Queensland Waste Data System (QWDS) • Work with regulatory agencies to tailor QWDS surveys to better reflect localised remote circumstances • Obtain specific QWDS data input support / assistance • Coordinate remote community support across agencies • Technical support and capacity building for remote local governments is required

Table D

Legislative Burdens and Regulatory Prescriptions

Remote Indigenous local governments are required to function in the same jurisdictional environment as all other local government authorities in Queensland. The Australian Local Government Association commissioned PricewaterhouseCoopers to produce the 2006 *National Financial Sustainability Study of Local Government*. The study states the following factors as common financial issues typically facing councils with sustainability problems:

- minimal (or negative) revenue growth
- cost growth that has typically exceeded revenue growth. Expenditures have been rising by an average of CPI +2-3% per annum. This cost growth is mainly due to award wage rises, stronger cost escalations in the maintenance and construction sectors as well as service diversification. The divergence between cost and revenue growth can lead to operating deficits that in turn are often partly funded by deferring some renewals expenditure

- increasing involvement in non-core service provision due to escalating community demands coupled with a related tendency by some councils to 'step-in' to provide a non-traditional service and some cost-shifting from other levels of government
- operating deficits creating a need to defer or underspend on renewal of infrastructure, particularly community infrastructure which is often repeated annually creating a backlog
- limited access to strong financial and asset management skills, which are critical to identifying sustainability problems, optimising renewals expenditure and improving revenue streams, and
- significant population growth… means infrastructure is augmented to meet demand. However, over the longer term, once the transitionary impacts moderate, a larger scale population, coupled with a modern asset base should improve the prospects for a council to be financially sustainable.

Further, the study states that enabling a council to respond directly to the service and infrastructure demands of an informed community would (amongst other matters):

- Provide for greater choice and consultation on council provided services and infrastructure, and encourage more participation in community activities raising levels of inclusion and wellbeing. This would promote increased community cohesion and safety, particularly in rural areas.
- Enable the implementation of local programs that recognise the diverse needs of communities and support cultural diversity, access and equity, equal opportunity, involving minority groups.
- Support sustainable environmental strategies for each community to improve local environmental outcomes.
- Enhance business and community links with regional areas to promote regional equity and development.

In relation to essential municipal service provision the study encourages local governments to establish a robust long-term service plan which defines what council will provide and how services will be undertaken, and further states that local governments should:

- Exercise caution prior to stepping in to attempt to resolve regional, state or national issues without a sound funding plan.
- Secure long-term funding (not just capital grants) prior to new services and infrastructure.

The findings of the 2006 study and its key recommendations could be applied directly to the present realities of waste management responsibilities placed on remote Indigenous councils. Relevant recommendations made by the study include:

- Improved funding for local councils, particularly for the renewal of community assets, would assist local communities by enabling councils to return important community infrastructure to acceptable levels of condition.
- In conjunction with improved financial and asset management practices, more appropriate funding levels for local government infrastructure and related services would help to ease the pressure of operating deficits.
- In addition, such extra funding would support the clearance of backlogs in renewals expenditure… and then also support more regular periodic maintenance to retain service levels.
- Importantly, additional funding would assist local government to take full advantage of their ability to flexibly gauge and respond to the changing demands at a community level.

- With increasing demands for a broader scope and higher standard of community services and infrastructure, it is important that local government has the resources to ascertain the priorities of the community, and to subsequently inform and consult with the community on the trade-offs of council provided infrastructure and services.

The Queensland State Government instigated a review of local government in 2007 (the *Size, Shape and Sustainability* review) which resulted in changes to local government arrangements across the state. In addition to the provision of a funded reform package, the Local Government Association of Queensland (LGAQ) recommended a number of models to obtain cost savings and improve sustainability, including:

- Retaining processes that require unique ad hoc local knowledge and are strategic
- Outsourcing non-strategic, low risk, rule based activities or high volume transaction processing
- Sharing or outsourcing to gain access to latest technology without ongoing significant capital investment or a requirement for a specialist expertise; and
- Sharing or outsourcing to gain expertise, which the local government could not otherwise afford.

Implementation

Across all case studies, remote area waste management and recyclables transfers to external processing centres is extremely expensive in terms of absolute cost, compliance, staffing, training and material costs. The actions required to address, for the longer-term, a growing waste burden in all case study communities will be numerous and will need to be staged over successive years of increased effort and investment.

Implementing improved resource recovery, waste minimisation and recycling will require PASC to develop waste reduction partnerships within the local community and beyond. Critical support will need to be secured through the Qld Container Refund Implementation Advisory Group and Queensland representatives on the National Environment Protection Council (NEPC) Committee.

Pormpuraaw is not a defined Remote Service Delivery location under the National Partnership Agreement for Remote Service Delivery. Queensland RSD communities are Aurukun, Coen, Doomadgee, Hope Vale, Mornington Island and Mossman Gorge. No specific additional resources have been committed to remote Indigenous communities outside of the RDS framework. A November 2016 Productivity Commission report[23] found systemic disadvantage prevails with existing Commonwealth Indigenous investment programs in large not capable of addressing this, nor in effect presently appropriately designed to do so.

The benefits of regionally aligned and technically supported coordination, where underpinned by strategic State agency resourcing, are evident from the initial success of the Big Rivers Waste Management Working Group (NT) in securing buy-in and resources across multiple remote local government agencies[24]. Remote Indigenous communities in the NT who have initiated stand-alone local container deposit scheme linkages also advise that the support of senior government representatives and community champions is critical[25].

Lessons learnt and recommendations arising from the Warraber Island Waste Pilot, which ran for a 12 month period during 2009-2010, will likely apply to all remote community recycling and include:

- The system requires behaviour change from the community, workers and management. A targeted education campaign is required to achieve this. Education needs to be ongoing and consistent.
- The entire waste system on Warraber Island [as a single remote location] should be integrated and the Pilot Project and general waste activities operated as a single system.
- Occupational health and safety (OH&S) issues need to be considered closely in future systems and ongoing education on OH&S issues is required.
- The community should continue with the system even during a breakdown of one of the system elements to reinforce the behaviour change.
- Suppliers need to provide training in the operation of their equipment and need to supply easy to understand operation and maintenance manuals.
- Maintenance assistance must be provided to the project.
- Supply of plastic bags from IBIS [local retail store] should cease.
- Project Champions at both the community and management level are needed. These people are

[23] Productivity Commission (2016) *Overcoming Indigenous Disadvantage: Key Indicators 2016* http://www.pc.gov.au/research/ongoing/overcoming-indigenous-disadvantage/2016#glance - accessed November 2017

[24] *Personal communications* Liam Harte Coordinator, Big Rivers Waste Management Working Group, Katherine Town Council NT, 7 December 2016

[25] *Personal communications* Melissa Bentivoglio, Women's Facilitator, Thamarrurr Development Corporation, Wadeye NT, 8 December 2016

the key to keeping the momentum of the project going.

- Businesses should be charged a levy to have their waste collected.
- Consideration be given to changing [organic waste digesters] from diesel to solar powered.

The local recycling process instigated at Wadeye (NT) by the Thamarrurr Rangers (Thamarrurr Development Corporation) relies on an existing Working on Country (WOC) investment and on being able to link into the NT's established container deposit scheme (CDS). Without these elements the program could not operate[26]. In early 2016 the Thamarrurr Rangers received a small grant of $15,000 to assist in the establishment and operation of a once-weekly community recycling day arrangement at Wadeye, which:

- established a CDS Collection Point at the Thamarrurr Ranger Base at Wadeye;
- trained 10 ranger staff to count and sort recyclable materials (items), and process direct refund payments;
- established the physical infrastructure for recycling, including areas for processing and storage, equipment and signage [note this did not extend to the construction of any new purpose-built infrastructure];
- established paper and computer systems for recording recycled items, and managing refunds and reimbursements;
- facilitated an MoU with a Darwin-based recycler (Bevcon Recycling Pty Ltd), to take CDS items from Wadeye and pay the [CDS aligned] 10c p/item refund plus a 2c p/item partial handling fee;
- negotiated support from a transport company to take bulk bags of recycling from Wadeye to Darwin each week, by back loading the truck or barge servicing the community (both are operated by Murin Freight);
- raised community awareness about the impacts of waste on the environment and recycling opportunities (several talks at the local school and a Rubbish Art Competition promoting the message "No Rubbish on Country", the project poster is reproduced on the following page);
- expanded the recycling service (mid 2016) to glass (as per CDS), lead acid batteries ($3 p/battery refund) and scrap metal. Both Murin Freight and Bevcon Recycling support the expanded service, with some 500 old batteries collected by community members and sent back to Darwin; and
- enabled six Thamarrurr Rangers to undertake a fieldtrip to the Bevcon Recycling Depot in Darwin, to help understand the stages in the recycling process and two rangers to attend the Australasian Waste and Recycling Expo (Sydney, August 2016) to share their experience of litter management in Indigenous Communities.

Community members are invited to bring their used (unwashed) beverage containers (plastic bottles, aluminium cans, tetra packs, glass bottles) to the Ranger Base each Friday, and receive the 10c p/item refund. Between January and November 2016 over 400 people collected some 315,489 beverage containers for recycling, generating direct local incomes totalling $31,500 in refunds. (note: these statistics do not include numerous donations of beverage containers made to the project: e.g. older cans pre-2012).

What needs to be done in the immediate term, by whom and by when (Table E)

[26] *Personal communications* David Curmi and Melissa Bentivoglio, Thamarrurr Development Corporation Wadeye (NT) 7 and 8 December 2016 (respectively)

Waste Reduction Partnerships	*What actions need to be taken?*	*When do the actions need to happen by?*	*Who needs to be involved?*
Community waste reduction partnership	Educate local community about recycling using tailored Waste Reduction Plans	2016 onwards	Pormpuraaw community members Pormpuraaw Aboriginal Shire Council Pormpuraaw Land & Sea Management Pormpuraaw Retail Store Nganchin Raak Mela Aboriginal Corporation Pormpuraaw Arts & Culture Centre Inc. PLSM Partners Pormpuraaw State School Remote Community Jobs Program providers NGO partners including Tangaroa Blue and Clean Up Australia
	Develop a local recycling plan for Pormpuraaw	2017	
	Consider, design and roll out improved local separation, transfer and recycling efforts, *including a viable local CDS*	2017	
	Continue supporting regular local and remote beach clean ups	Ongoing	
Regional remote Indigenous local government waste reduction partnerships	Share local learnings and experience about waste management approaches, *with a particular immediate focus on CDS capacity in remote areas*	2016 onwards	Qld Government Community Champions Cape Indigenous Mayors Alliance Indigenous Leadership Group (CEOs) Pormpuraaw Aboriginal Shire Council CEO and Councillors Qld Container Refund Implementation Advisory Group (https://www.ehp.qld.gov.au/waste/container-deposit-scheme.html) Local Authority Waste Management Advisory Committee (http://www.lawmac.org.au/)
	Lobby to secure dedicated waste and recycling support resources, in particular staff funds and skills development	2017	
	Promote remote recycling enterprise opportunities if considered appropriate	2017	
Strategic industry / corporate waste	Scaling up across communities is a pre-requisite for commercial	2017 and beyond	Qld Government Community Champions

Waste Reduction Partnerships	*What actions need to be taken?*	*When do the actions need to happen by?*	*Who needs to be involved?*
transfer partnerships	operators to engage more effectively		Senior Queensland Government officials, including Ministers Department of Environment & Heritage Protection (DEHP) Waste re-processors / commercial recyclers
	Market prices for recycled materials (e.g.: scrap metal) will determine interest in collaboration / assistance	Ongoing	
	Corporate social licences / native title compensation schemes can generate substantial hard waste burdens in remote areas – corporate social responsibility has real consequences	*Not currently an active issue for Pormpuraaw*	Locally active mining companies Qld Minerals Council and other industry representative groups
State agency support	Targeted support to improve local government waste and recycling infrastructure e.g. Building Our Regions funds[27]	2017 and beyond	Depts. of State Development, Local Government & Planning, DATSIP Indigenous Leadership Group (CEOs) Cape Indigenous Mayors Alliance
	Continued support for local land and sea management rangers through Qld Indigenous Land & Sea Rangers program	Ongoing	Pormpuraaw Aboriginal Shire Council Pormpuraaw Land & Sea Management
	Continued support for integrated environmental health outcomes in remote areas	Ongoing	Queensland Health – Environmental Health Unit Pormpuraaw Aboriginal Shire Council
Commonwealth support	Targeted support for implementing the National Waste Policy through the National Environment Protection Council (NEPC) Committee http://www.nepc.gov.au/	2017 and beyond	*Qld representatives* Committee member Mr Tony Roberts (DEHP) Senior Officers Group Mr Jon Black, Director General DEHP

[27] http://www.statedevelopment.qld.gov.au/regional-development/building-our-regions.html

Waste Reduction Partnerships	*What actions need to be taken?*	*When do the actions need to happen by?*	*Who needs to be involved?*
	home		
	Commitment to secured resourcing for Indigenous land and sea management	Ongoing	Dept. of Prime Minister and Cabinet, Minister for Indigenous Affairs Far North Indigenous Coordination Centre Indigenous Leadership Group (CEOs) Cape Indigenous Mayors Alliance
NGO support	Opportunities for potential collaboration in the recycling of marine debris and other plastics need to be brokered, resourced and implemented	Ongoing	Tangaroa Blue Oceanwatch Australia Clean Up Australia Cape York NRM Boomerang Alliance GhostNets Australia (not currently active – presently un-funded)

Table E

Costs and resources required for implementation

A list of selected waste /mitigation reduction / recycling equipment suppliers consulted as part of this case study is at Appendix B. All state that they have supplied remote communities previously and have adapted machinery for safe and easy remote community use. The authors of this report do not endorse in any manner any of these businesses, nor the products they supply.

Recommendations for cost effective investment from state and national actors to address key waste management needs that can be prioritised are listed below. The indicative costings have been incorporated into Local Waste Reduction Plans developed through this project for the further use and reference of all participating case study communities.

Indicative costs: Debris, Recycling, Maintenance, Manpower (Table F: parts 1, 2 & 3)

Immediate Requirements	*Details*	*Indicative base costings (GST and freight excl.)*	*Rationale/Comment*
Marine debris management	Marine debris removal from remote beaches along the Shire's coastline adjacent to the Gulf of Carpentaria. In PLSM's current WCTTAA work plans – there is now significant uncertainty about the Australian Government's intent re WCTTAA post-2018	*Part of QILSR funded work program linked into WCTTAA activities to reduce feral populations predating on endangered nesting marine turtle species in particular Olive Ridley (most CYP nesting sites presently recorded for this species are situated in the Pormpuraaw region)*	*PLSM Rangers survey and undertake regular areal and on-ground patrols during marine turtle nesting seasons, and remove ghostnets from beaches as part of the WCTTAA program. This program targets predation of turtles and other native species.*
Brokering locally viable recycling / remote container refund scheme implementation	Part time local / Council position or locally preferred supplier	Minimum of $50,000.00 over initial 12 months (2017-2018)	*Brokerage with local and regional parties to design and instigate effective local remote recycling arrangements*
Coordinating locally viable recycling	Minimum 1 full time position plus on-costs	from $75,000 per staff position per annum	*Implementing on-going local and regional coordination*
Community Education program *These examples are sourced from the Warraber Island Waste Pilot report Aurecon (2011)*	– Community meetings – Radio interview with project team – Involvement through the school including art design competition, general giveaways and school projects. Repeated on a number of occasions – Meetings with council and other businesses – Posters, fridge magnets and stickers in both English and local language – Community launch and project blessing including community BBQ – One on one meetings with households to deliver new equipment – Ongoing education and training		
Council (or private enterprise) plant for local recycling	Multi-purpose shredder	from $40,000	*Volumetric compaction of bulk recyclables, reduces incineration frequency at landfill*
	Mini-compactor	Price on application (POA)	*Improved waste data collection in real time*
	Crusher/Baler	between $25,000 - $40,000	*Volumetric compaction for a range of materials*
	Medium size cardboard chipper	between $6,000 - $15,000	*Local on-site cardboard recycling (mulch, organic packaging), reduces incineration frequency at landfill site*

Immediate Requirements	*Details*	*Indicative base costings (GST and freight excl.)*	*Rationale/Comment*
	Purpose-built shed	up to $100,000	*All weather recycling*
	Recyclables collection / local transfer vehicles	from $60,000	*Reduces volumes of waste entering landfill*
	Bulk storage (shipping) containers	from $2,500 each	*Safe, secure storage of recycled resources pre-transfer to recyclers (resources are valuable)*
	Data management (e.g.: computer, printer)	$4,000	*Item count, refund cash records management*
	PPE and padlocks etc.	$3,000	*OH&S*
	Indicative total set up costs per community	in the order of $350,000	*Cost is commensurate with Warraber Is pilot. Figure does not include wages, on-costs etc.*
	Indicative annual operational costs	$120,000	*Assumes a min. of 1 additional FT staff*
	Indicative annual maintenance costs	$7,500	*Assumes some FIFO technical assistance*
	Warraber Is. Pilot initial set up cost total (2009)	$345,065	*All figures contained in Aurecon (2011)*
	Warraber Is. Pilot 1 year operational cost (2009)	$89,769	
	Warraber Is. Pilot 1 year maintenance cost (2009)	$5,300	
Transport for external transfers	Negotiated with transport service providers	*Likely part of a local / regional brokerage role, requires industry support*	*Requires additional local government human resources to coordinate*

Table F (part 1)

Medium Term Requirements	*Details*	*Indicative base costings (GST and freight excl.)*	*Rationale*
Local integrated recycling system - brokered, coordinated and fully operational	Staffed multi-purpose shredding plant eg: MPS 50HD or model with hammermill[28]	$275,000 - $0,000+	*[This type of shredding plant presently in use at Nhulunbuy (see image on footnoted web-link]*

[28] An example of this type of plant can be seen at http://www.brentwood.com.au/machine/shredding-plants accessed December 2016

Medium Term Requirements	*Details*	*Indicative base costings (GST and freight excl.)*	*Rationale*
	at least 1 additional full time technical position placed with Council	from $120,000 p.a. plus on-costs	*On-site maintenance requires certain level of technical competency*
Local recycling enterprise development	Locally owned and operated recycling enterprises	Set up and operational costs	*Case study communities have indicated there is some local scope for private operation of recycling activities*

Table F (part 2)

Long Term Optimum	*Details*	*Indicative base costings (GST and freight excl.)*	*Rationale*
Bio-digester or other waste to energy system / technology	Integrated industrial scale system which could service the entire CYP region (may require 2 systems to effectively service the entire region given remoteness and distances involved.	> $2M not including staffing, operational or maintenance costs	*Emissions neutral* *Uses and produces renewable energy* *Significantly reduces volumes of waste entering remote landfills* *Addresses waste related environmental impacts (water quality, contamination) and improve remote Indigenous environmental health*
Local and regional recycling enterprises and remote area Indigenous economic development	Local Indigenous owned and operated recycling, transport and related enterprises	N/A	*Case study communities have indicated there is some local scope for private operation of recycling activities*

Table F (part 3)

Abbreviations

AMDI	Australian Marine Debris Initiative
APC	Australian Packaging Covenant
C&D	Construction and Demolition [standardised municipal waste category]
C&I	Commercial & Industrial [standardised municipal waste category]
CDS	Container Deposit Scheme
COAG	Council of Australian Governments
CSC	Cook Shire Council
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CYP	Cape York Peninsula
CYMAG	Cape York Marine Advisory Group
DATSIP	Department of Aboriginal and Torres Strait Islander Partnerships (Queensland)
DEHP / EHP	Department of Environment and Heritage Protection (Queensland)
DOGIT	Deed of Grant in Trust
GNA	GhostNets Australia
ILUA	Indigenous Land Use Agreement [Commonwealth and Queensland native title acts]
LAWMAC	Local Authority Waste Management Advisory Committee [NQ LGA waste engagement]
LGA/LGAs	Local Government Area/s
LGAQ	Local Government Association Queensland
MRF/s	Materials recovery facility / facilities
MSW	Municipal Solid Waste [standardised municipal waste category]
NAILSMA	North Australian Indigenous Land & Sea Management Alliance Ltd
NESP	National Environmental Science Program
NPA	Northern Peninsula Area [northern-most municipality on CYP]
NQ	North Queensland
NRM	Natural Resource Management
NT	Northern Territory
PACCI	Pormpuraaw Arts & Culture Centre Inc.
PASC	Pormpuraaw Aboriginal Shire Council
PLSM	Pormpuraaw Land & Sea Management
PDR	(Cape York) Peninsula Development Road
QILSR	Qld Indigenous Land & Sea Ranger program [State funding for Indigenous ranger groups]
Qld	Queensland
QWDS	Queensland Waste Data System
RCJP	Remote Community Jobs Program
RNTBC	Registered Native Title Holding Body Corporate
TAP	Threat Abatement Plan
TBF	Tangaroa Blue Foundation (Tangaroa Blue)
WCTTAA	Western Cape Turtle Threat Abatement Alliance
WOC	Working on Country program [Commonwealth funding for Indigenous ranger groups]

References

Aurecon Australia Pty Ltd and APC Environmental Management (2011) *Project Overview and Review Warraber Island Waste Pilot Torres Strait Island Regional Council*, Aurecon Australia Pty Ltd Cairns

Commonwealth of Australia (2016) *Source: Steering Committee for the Review of Government Service Provision, Overcoming Indigenous Disadvantage 2016.* Productivity Commission Canberra

Commonwealth of Australia (2009) *Threat abatement plan for the impacts of marine debris on vertebrate marine life.* Australian Government Department of the Environment, Water, Heritage & the Arts. Canberra.

CYMAG Environmental Inc. (2009) *Eastern Cape York Peninsula Beach Rubbish Assessment 2007 and 2008*, report compiled by J. Hinchcliffe and C. Howley, Cape York Marine Advisory Group (CYMAG) Cooktown

Department of Environment and Heritage Protection (2014) *Waste—Everyone's responsibility: Queensland Waste Avoidance and Resource Productivity Strategy (2014–2024)*. Department of Environment & Heritage Protection, Queensland Government, Brisbane.

Department of Environment Protection and Heritage Council and the Department of the Environment, Water, Heritage & the Arts (2009) *National Waste Policy: Less Waste More Resources*. Environment Protection and Heritage Council, Canberra.

East Arnhem Regional Council (2015) *East Arnhem Regional Council Waste Management Strategy 2015 – 2025* - http://www.eastarnhem.nt.gov.au/waste-strategy/ - accessed September and December 2016

Green, D. L. (2006) *Climate change and health: impacts on remote Indigenous communities in northern Australia*. Commonwealth Scientific & Industrial Research Organisation Marine & Atmospheric Research

Local Government Association Northern Territory (2015) *The Big Rivers and Katherine Landfill Operating Manual,* Local Government Association NT.

PricewaterhouseCoopers (2006) *National Financial Sustainability Study of Local Government*, report prepared for the Australian Local Government Association, PricewaterhouseCoopers Sydney

Remondis Australia Pty Ltd (undated) *Summary of the confidential REMONDIS / Rhenus submission to the discussion paper for Container Deposit Scheme in New South Wales*, Mascot

State of Queensland (2011) *Waste Site Characterisation Survey Final Report*, Dept. of Environment & Resource Management

State of Queensland (2016) Appendix C, *Report 2: Forecasting long-term sustainability of local government,* Queensland Audit Office

Steering Committee for the Review of Government Service Provision (2016) *Overcoming Indigenous Disadvantage: Key Indicators 2016,* Productivity Commission, Canberra.

Thamarrurr Development Corporation (unpub.) *Rubbish Art Report*, Thamarrurr Rangers, Wadeye NT 2016

Tangaroa Blue Foundation (2014) *Marine Debris Management Plan, For Cape York Peninsular and the Torres Strait Islands, Far North Queensland*, An Australian Marine Debris Initiative Report.

Tangaroa Blue Ocean Care Society (2009) *Far North Queensland Marine Debris Project Report*

Key Legislation

Biosecurity Act 2014 (Qld)

Environment Protection Biodiversity Conservation Act 1999 (Commonwealth)

Environmental Protection Act 1994 (Qld) - Environmental Protection (Waste Management) Regulation 2000 (Qld)

Environmental Protection Regulation 2008 (Qld)

Qld Fisheries Act 1994 (Qld)

Great Barrier Reef Marine Park Act 1975 (Commonwealth), Protection of the Seas Act 1983 (Commonwealth)

Local Government Act 2009 (Qld)

Planning Act 2016 (Qld), Sustainable Planning Act 2009 (Qld)

Waste Reduction and Recycling Act 2011 (Qld) - Waste Reduction and Recycling Regulation 2011 (Qld)

Appendices

APPENDIX A – Case Study Research Participants and Informants

Pormpuraaw Community

Mylene Holroyd, Kuugu, Pormpuraaw Arts & Culture Centre Inc. (PACCI)
Christine Holroyd, Kuugu, PACCI
Jeanie Holroyd, Kuugu Elder, PACCI
Christine Yantumba, Kuugu, PACCI
Cr Tim Koo-aga, Pormpuraaw Aboriginal Shire Council, Kuugu
Edward Natera, PASC CEO
Robbie Morris, PASC Environmental Manager, Pormpuraaw Land & Sea Management
Andrew Healy, PASC Operations Manager
Hassan Binawell, PASC Council Stores Manager
Paul Jakubowski, Coordinator, Pormpuraaw Arts & Culture Centre Inc.
Rebecca Hafner, Pormpuraaw Indigenous Knowledge Centre (PASC Library)
Store Manager, Retail Stores Branch (RBS) Retail Store, Pormpuraaw
Relief Store Manager, RBS Retail Store, Pormpuraaw

Other project informants

Planet Ark
MobileMuster
Eoin Quinlivan, Director Retail Stores Branch (RSB) Department of A&TSI Partnerships
Cr Alan Wilson, Deputy Mayor, Cook Shire Council, LAWMAC Chair, past Chair Queensland CDS Advisory Committee
Lana Polglase, Wattle Hills resident
Heidi Taylor, Tangaroa Blue Foundation
Rikki Gunn, Ghostnets Australia
Maya Reddy, Manager of remote community shops, Anglican Diocese North Queensland
Lyndal Scobell, Communications Manager Cape York Natural Resource Management (CYNRM)
Kerri Woodcock, Coordinator Western Cape Turtle Threat Abatement Alliance (WCTTAA)
Joanna Karam, former WCTTAA coordinator
Mika David, Senior Environmental Manager, Torres Strait Island Regional Council
Rob Drew, Council Services Manager, Kalkarindji and Daguragu, Victoria Daly Regional Council NT
David Curmi, Ranger Manager, Thamarrurr Development Corporation, Wadeye NT
Melissa Bentivoglio, Women's Facilitator, Thamarrurr Development Corporation, Wadeye NT
Liam Harte, Coordinator, Big Rivers Waste Management Working Group, Katherine Town Council NT

Commercial informants

John Waston, Proprietor RamCan Pty Ltd
Ken Russ, Sales Manager Qld, Wastech Engineering Pty Ltd
Graham Badman, Managing Director, Bentwood Recycling Systems
Manager of REMONDIS Weipa Waste Facility
TechCollect
Weipa Business Equipment

Project sub-contract manager

North Australia Indigenous Land & Sea Management Alliance Ltd (NAILSMA)

APPENDIX B – Selected Recycling Equipment Suppliers

The following Australian businesses, specialising in recycling plant manufacture and supply, have directly informed indicative equipment pricing included in this report. All state that they have supplied remote communities previously and have adapted machinery for safe and easy remote community use. The authors of this report do not endorse in any manner any of these businesses, nor the products they supply.

- Bentwood Recycling Systems
- RamCan Pty Ltd
- Wastech Engineering Pty Ltd

The below companies have been identified as potential industry partners by this project's informants. Again, the authors do not endorse in any manner any of these businesses, nor the products they supply.

- Australian Composite Technologies - http://www.plasmar.com.au/
- Newport Recycling Cairns - http://www.newportrecyclinggroup.com.au/page1.aspx
- REMONDIS - http://www.remondis.com.au/en/reau/sonderseiten/home/
- Sims Recycling Solutions - http://au.simsmm.com/
- Toro Industries - http://www.torowasteequipment.com.au/
- Visy - http://www.visy.com.au/recycling-services-enquiry/
- Zebra Metals www.zebrametals.com.au

APPENDIX C – Local Waste Reduction Plans developed through this project

The following documents have been developed as part of this project in consultation with research participants from the Pormpuraaw community.

These plans are at draft status only, and are not public documents.

All materials have been provided to the Pormpuraaw Aboriginal Shire Council for further local consideration, finalisation and/or adoption.

Local Waste Reduction Plans (WRP) developed through this project:

Illegally Dumped Waste WRP

A viable container refund scheme at Pormpuraaw WRP

Packaging Waste coming into Pormpuraaw WRP

Coordinated Recycling at Pormpuraaw WRP

Marine Debris on Pormpuraaw's Beaches WRP

Back cover images © PLSM / PASC, 2013 and 2014
Extreme seasonal variations: dry season savannah landscapes and typical wet season inundation
Pormpuraaw Aboriginal Shire, Cape York Peninsula Australia