

Throsby Creek Catchment

Throsby Creek and its tributaries form a highly modified drainage network that collects stormwater from the major part of central Newcastle and conveys it to Newcastle Harbour. The catchment of the creek covers an area of approximately 3,000 hectares, the majority of which are within the boundaries of Newcastle City Council area. A small section of the upper catchment falls within the Lake Macquarie City Council area.

The upper parts of the catchment are bounded in south and south-west by Lookout Road, Charlestown Road and Pacific Highway (to Merewether Heights). The lower catchment is bounded to the north-west by Waratah and Mayfield (West through to East), to the north along a drainage line generally between Maitland Road and Industrial Drive, and to the east and south-east by the suburbs of Wickham, Hamilton and across Broadmeadow Racecourse. Figure 10 shows the extent of the Throsby catchment, major suburbs, transport networks and Hunter Water's stormwater channels.

Few places within Throsby catchment remain in a relatively natural state with the majority of the drainage network being channelled in concrete stormwater drains and the landuse predominantly residential. One exception to this is Blackbutt Reserve, which constitutes one of the largest remaining natural bushland pockets in the City, and forms part of the headwaters of the catchment. The area around the old mine at the top of the main channel and the Army reserve east of Bruncker Road are two other areas in a relatively natural state. There are a number of active Landcare, Bushcare and community groups in the catchment who work towards achieving protection of the natural values of the catchment. However, heavy use and park infrastructure also contribute to pollution loads within the catchment.

Urbanisation of the lower catchment commenced in the mid to late 1800s and continues today with infill developments and small developments in the steeper upper catchment. The majority of urbanisation of the sloping lands of the mid to upper catchment is thought to have occurred during the 1960s and early 1970s. The population of the catchment today is 67,512 - equivalent to 21.4 people per hectare (Wolfenden, 1999), which is quite high by Australian standards, being exceeded only by some densely settled inner suburbs of the main cities. Landuse in the catchment comprises predominantly built environment with only 23% of the catchment existing as bushland or open space. This will clearly influence catchment management techniques that could be constructed.

Table 11: Landuse in the Throsby Creek Catchment. (Wolfenden, 1999)

Landuse	Area (hectares)	Percentage of Catchment
Bushland, mostly regrowth	280	9
Parks and recreational areas	420	14
Built environment (dwellings, commercial and light industrial)	2,450	77
Total	3,150	100

Although the catchment landuse is predominantly residential, the industrial and commercial areas play significant roles in the stormwater issues due to their increased areas of hard surfaces; eg car parks, roof tops and storage yards which provide little infiltration for stormwater.

Downstream of Tighes Hill, the creek is tidal. The very low gradients for this part of the Creek create a depositional environment and so sediment accumulates from the catchment. This lower section of the creek flows through the inner city suburbs of Islington, Wickham, Maryville and Carrington and has been the site of major restoration works as part of the implementation of the TCM strategy. \$6 million has been spent on dredging in response to the large volumes of sediments that have accumulated over time. Dredged material from the tidal stretches of the creek was estimated at 73,900 cubic meters. Dredge material analysis revealed high levels of iron. (Public Works Department, 1991). It is also in this area, among the mangrove forests along the Carrington foreshore, that litter and other forms of pollution now tend to accumulate.

Detailed analysis of Throsby Creek catchment relevant to the identification of stormwater issues, including, erosion, sedimentation, foreshore development, hydrology, pollution, ecosystem, sub-catchment delineation and tidal inundation etc appear in:

- Throsby Creek TCM Strategy Task Group Reports (1989),
- The revised Throsby Creek Strategy Action Plan (2001); and
- The Throsby Creek Catchment Gross Pollutant Study completed for Hunter Water Corporation by WBM Oceanics (2000).

The Throsby Creek TCM Strategy (1989) was successful in addressing many significant issues within the catchment. Improvement in aesthetic appeal for the tidal section of Creek between Maitland Road and Hannell Street has been spectacular, with the establishment of mangroves, bank vegetation, community access points, bike tracks and art installations.

The boardwalk constructed amongst the mangroves between Hannell and Cowper Street Bridges, has added a valuable ecological and recreational asset to the community. The foreshore restoration work carried out by the Honeysuckle urban development, around the old Wool Stores site, has also increased the recreational and aesthetic values of this area. Mangroves act as filters in tidal sections of natural ecosystems, so it is no surprise that they also 'filter' litter and other pollutants in an urbanised environment.

The Throsby Creek TCM Committee revised the Throsby TCM Strategy (1989) and developed the Throsby Creek Strategy Action Plan (2001) to address heightened community awareness values, and take advantage of new approaches and technologies. This committee has now been superseded by the Newcastle Catchment Management Forum, as a committee of the Hunter Central-Rivers Catchment Management Authority under NSW government restructure of the Department Infrastructure & Natural Resources. The Newcastle Catchment Management Forum continues to oversee the delivery of natural resources management, however its charter now covers all the catchments within the Newcastle LGA boundary.

Hunter Water controls 52.75km of stormwater infrastructure in the Throsby Creek network. The drainage network is complex, comprising some 59 branches and sub-branches, and made up of a combination of open channels, pipes and culverts. The infrastructure in Throsby Creek was completed in 1936, with some additional works conducted as late as 1978.

Existing stormwater treatment devices installed by Hunter Water include:

- One trash rack on the Adamstown Branch, between District Park Tennis Centre and the Westpac Rescue Helicopter headquarters;
- One "CDS" unit or end of line pollution trap located on the Lambton Branch of the creek, between Energy Australia Stadium and the Hockey Centre, and
- One sediment trap, with a floating boom in the Throsby Creek system located in the Main Channel, between Chin Chen St and Maitland Rd, adjacent to the Tighes Hill TAFE. The floating boom efficiency has been the source of continual improvements as Hunter Water seeks to reduce the impacts of large items such as shopping trolleys and tyres snagging the boom when they reach this point in the channel.

Hunter Water's program of maintenance works in Throsby Creek catchment also includes:

- Sediment trap - remove accumulated sediment every 3 months. Estimated 20 cubic metres/ month material is collected;
- Floating boom at Tighes Hill - inspected weekly and remove accumulated floatable matter. Reinstall boom if broken as soon as practicable. Est. 10 cubic metres/ mth material collected;
- Trash Rack - inspect weekly, clearing material from the screens into the collection area, empty collection area monthly. Est. 3 cubic metres/ mth material collected;
- CDS Unit inspected and remove accumulated material bi-monthly. Est. 10 cubic metres/ mth material collected;
- Reporting on volumes of any litter (and composition) and silt removed;
- Maintenance of the grounds along the drains, in a three weeks cycle from September to April inclusive and a five weeks cycle from May to August. This includes a minimum distance of three metres measured horizontally from the outside edge of the stormwater channel or as specified. All

clippings are to be collected and removed from the site, including the clippings that have fallen into the drain; and cleaning the inside of the channels.

Council has undertaken numerous collaborative, integrated stormwater projects, including “at-source” control device trials and education interventions, within the Throsby Creek catchment over the past years. Such projects have produced stormwater quality treatments such as:

- Sediment trap device or “baffle-box” in Kotara, that removes an average of 1 cubic metre of sediment per week from system;
- “Natural channel” rehabilitation of eroded creeks & drainage lines such as Kullaibah Reserve and Black Duck Creek that stabilise bed and bank erosion, so removing sediment sources from system;
- Street pit entry covers for the Lambton Shopping Centre to prevent litter, down to cigarette butt size, from entering the drainage system;
- Creek friendly car park designs that infiltrate road runoff prior to entering creek at Community greening Centre, Kotara as well as remove oils/ grease and litter in the case of Energy Australia Stadium car park stormwater inlet devices; and
- Targeted community engagement methodologies such as “Gutter Talk” that have created improved stormwater behaviours, ownership and attitudes when delivered at a street corner or neighbourhood scale.

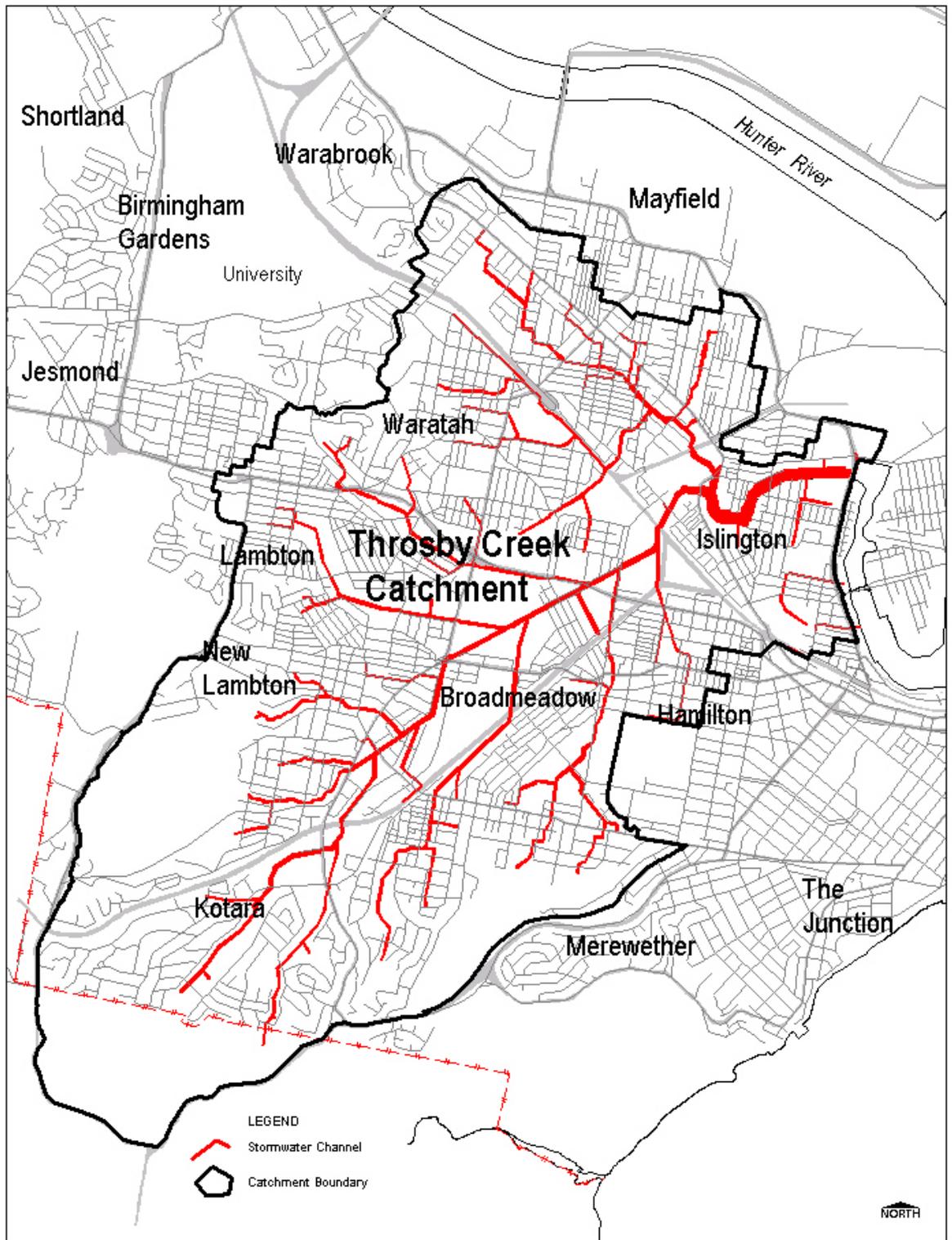
The delivery of such projects has been influenced by the strategic direction chartered by Council in the preparation of an Urban Water Cycle Management Policy for Newcastle (2004). In addition the outcomes of the Throsby Creek Catchment Gross Pollutant Study (WBM Oceanics, 2000) provided valuable data on the indicative gross pollutant generation across 22 distinct sub-catchments identified for Throsby Creek. See Figure 11.



Photo 14:

The Lambton Ker-rai Creek naming ceremony, Lambton Park 2003. Council's stormwater education project in Lambton sub-catchment triggered an active community response that ultimately delivered a naming process for the local creek that runs through Lambton Park. (Ker-rai in Awabakal language means stream). Local residents continue to be involved in planning to improve the natural features and environmental performance of the Lambton Ker-rai.

Figure 10: Throsby Creek Catchment



Throsby Creek Catchment



Photo 15:

The Adamstown Branch stormwater channel within Throsby Creek catchment, showing the trash rack that has collected leaves, fast food wrappers, plastic bags, tyres, soft drink bottles and paper. Sediments in the form of mud and dirt also collect behind the grids of the rack. Regular cleaning is required to prevent litter load further down the catchment clogging the grids and hence, sending stormwater over, rather than through the grids, and so carrying its litter.

Hunter Water conducts limited stormwater sampling in Throsby Creek, at the Hannell St Bridge. Dry weather samples are taken monthly, with wet weather samples conducted during all significant rain events. This sampling frequency means that the results are skewed by wet weather samples. It is also noted that the samples would represent substantial dilution due to the tidal nature of the Hannell St bridge site.

Additionally, the number of samples - around 20 - are insufficient to draw conclusions about the overall quality but can give some indication as to the quality of stormwater.

Results are summarised in Table 12 below, and preliminary assessment of the data indicates that:

- BOD may not be a concern in regard to stormwater management;
- Dissolved oxygen concentrations remain reasonably constant in dry and wet conditions;
- As expected, faecal coliform levels are higher during rain events;
- Suspended solids levels are of concern in Throsby Creek; and
- Phosphorous and Nitrogen levels appear high if compared to ANZECC guidelines, however ANZECC suggest site specific studies be undertaken to determine desired levels for individual waterways.

In September 1996, Hunter Water, in conjunction with the Hunter Catchment Management Trust undertook a water quality sampling program which included two sediment samples. On October 25, 1996 and March 18 1997, Hunter Water took sediment samples from Throsby Creek, on the Mayfield Branch opposite the Tighes Hill Bridge, and from the main channel near the bowling club. The results are summarised in Table 13.

Despite the lack of applicable guidelines for estuarine/marine sediments, results were compared to the Draft EPA Biosolids Guidelines (1995) with respect to recommended exposure settings. All metals, with the exception of lead and zinc, complied with Grade A exposure settings - the highest standard suitable for use in playgrounds and other contact areas.

Table 12: Summary of Water Quality data for Throsby Creek (Hannell St Bridge)

Unit		Dates Samples	Mean	Max	Date	Rain (mm)	Min	Date	Rain (mm)
BOD	mg/L	8/5/96 to 20/11/98	5.04	6	18/11/98	101.40	5		
DO	mg/L	2/7/97 to 20/11/98	6.96	9.1	18/11/98	101.40	3.62	20/11/98	15.4
FC	col/	13/12/95 to 20/11/98	6303	36000	19/11/98	52.40	4	14/1/98	0
SS	mg/L	2/7/97 to 20/11/98	61	388	18/11/98	101.40	14	10/8/98	0
								14/1/98	0
TON	mg/LN	13/12/95 to 20/11/98	0.34	1.6	19/11/98	52.40	0.01	11/3/98	0
TP	mg/L P	13/12/95 to 20/11/98	0.12	0.39	10/7/96	0.00	0.016	8/8/96	0

Table 13: Summary of sediment sampling (25-10-96 and 18-3-97) for Throsby Creek

Metal	Result
Arsenic (As) (mg/kg)	6.9
Chromium (Cr) (mg/kg)	74
Lead (Pb) (mg/kg)	330
Mercury (Hg) (mg/kg)	0.3
Zinc (Zn) (mg/kg)	730
Cadmium (Cd) (mg/kg)	1.3
Copper (Cu) (mg/kg)	110
Nickel (Ni) (mg/kg)	45

Both lead and zinc were somewhat elevated, being classified as Grade C exposure - suitable for use in a residential environment with a substantial vegetable garden. However, both lead and zinc concentrations had reduced slightly from a similar sampling program in 1991.

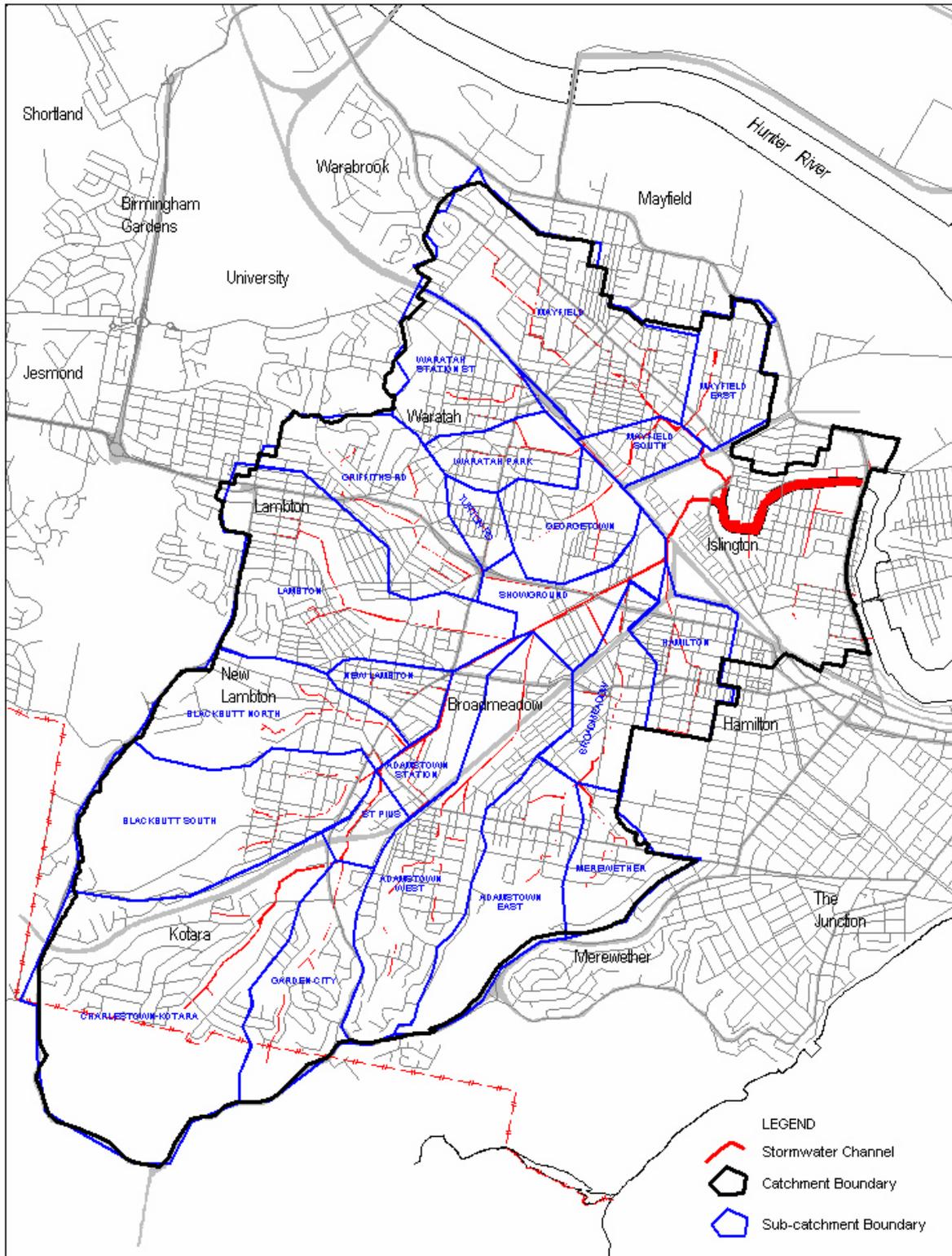
Additional sampling periods are required.

Site visits have indicated that a number of pollution issues exist in the catchment including, but not limited to:

- Supply and collection frequency of council litter bins in open spaces and the lack of litter barriers around some channels;
- High litter levels on the streets and in the gutters;
- Litter accumulation amongst the mangroves and tidal sections of the catchment;
- Grass clippings and garden wastes in close proximity to channels; and
- Sedimentation loads from denuded banks, roads and median strips.

The responsibility for urban stormwater management within Throsby Creek Catchment is shared between Council, Hunter Water, and Lake Macquarie City Council.

Figure 11: Throsby Creek Catchment - breakdown into 22 sub-catchments



Throsby Creek Catchment and Sub-catchments

