# Spatial imagery for management of Submerged Aquatic Vegetation (SAV) in the River Derwent estuary

*Evaluation of spatially referenced imagery for environmental inventory, surveillance and monitoring of submerged aquatic vegetation (SAV, including seagrass)*

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Dr Richard Mount

Blue Wren Group,
School of Geography and Environmental Studies, University of Tasmania



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Cover photo**:** Swans feeding on seagrass, River Derwent estuary. Photo by Richard Mount, 2009.

# Summary


- The project involved a series of low-cost **air and field campaigns** including via small waterborne craft (kayak) and light fixed-wing aircraft with an aerial photography port in the floor. Satellite imagery was also obtained as it became available at low or no cost. The following **information base** was produced:
    - **Low-cost though-water aerial imagery** captured from a light plane with small-format digital cameras, including infrared imagery. Imagery was captured for the upper Derwent estuary, Cornelian Bay, Ralphs Bay and Half Moon Bay.
        - For the upper Derwent estuary, the images were used to produce a very high resolution georeferenced **orthophoto mosaic** with an accuracy of ~1 m. The mosaic is the best image map available to date.
    - A **spatial database** that is designed to support monitoring purposes and that contains
        - SAV habitat mapping
        - Proposed mapping and names for the seagrass “banks”
        - A time series of georeferenced imagery over the upper Derwent estuary.
    - Spatially referenced **oblique imagery** from the air, the shores, the water surface and underwater – all publically available at <http://picasaweb.google.com/dep2utas>.
- **Descriptive and quantified information processing methods** were developed about the submerged aquatic vegetation of the upper Derwent estuary to assist management activities, as follows:
    - A proposed approach to **classification** of the imagery to extract ecologically meaningful information, with classes including seagrass condition, rhizome mats and bare mud.
    - A proposed method for interpreting the imagery using “**megaquadrats**”. Three such examples are provided from the existing spatial database in this report.
    - A proposed method for efficiently adding to the **monitoring time series**, both into the future and recovering past imagery.
- It is possible to **detect changes** in physical properties in the imagery that are indicative of key ecological processes in the upper Derwent estuary, including
    - Changes in the location and extent of actively growing seagrass via bright green foliage
    - Changes in the location and extent of benthic cover including bare mud, seagrass and rhizome mat
    - Changes in the location and extent of seagrass “pool” habitat (i.e. openings in the seagrass canopy a few meters to 10s of meters wide)
    - Changes in the location of tidal/drainage channels within the seagrass banks
- The imagery could **not** be used to identify the deep edge of the seagrass beds, seagrass density (percent cover) or patchiness. The data suitable for assessment of microphytobenthos or *Macrocystis* was also not obtained.
- It is **recommended** that
    - The vast archive of **historic aerial photography over the past 60 years** is assessed for to provide a context for monitoring into the future as it is almost certain that suitable imagery will be found.
    - **New aerial imagery** is collected mainly via light fixed-wing aircraft, though other sources should also be considered.
    - **Geo-located “water surface” imagery** is collected in key locations for monitoring purposes.
    - All imagery be stored in a **spatial database** capable of producing time series via megaquadrats

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# 1. Introduction

This project is designed to collect spatially referenced remote sensing imagery to identify practical and feasible methods of supporting the environmental surveillance, inventory and monitoring of submerged aquatic vegetation (SAV), in particular, targeting seagrass in the upper and mid Derwent estuary.

The imagery is intended to produce inventory and monitoring information products that are ecologically relevant to the management of the SAV in the Derwent estuary. Initial variables of interest were; changes in location of deep edges, seagrass density (percent cover) and patchiness (spatial metrics), though other variables are to be extracted where the imagery permits.

The following additional assessments will be undertaken, if resources allow:

- microphytobenthos (MPB) in the upper estuary
- MPB throughout sandflats within greater Ralphs Bay
- seagrass at South Arm (notably Halfmoon Bay), and
- Macrocystis (giant kelp) along the eastern Tinderbox Peninsula and Iron Pot areas.

This work was initiated and guided by the Derwent Estuary Program and undertaken by the School of Geography and Environmental Studies, University of Tasmania.

# 2. Methods

Broadly, the project involved a series of low cost air and field campaigns including via small waterborne craft (kayak) and small fixed wing aircraft with an aerial photography port in the floor. Satellite imagery was also obtained as it became available at low or no cost. All geoprocessing was done in ESRI ArcMAP™ Version 10, with data referenced to MGA94 Zone 55 (GDA94) and AHD vertical map datum. The production of orthophotos was conducted with Myriax Landscape Mapper Version 1.4 using the Climate Futures LiDAR data for relief correction.

Supporting data was supplied by the Tasmanian Aquaculture and Fisheries Institute (TAFI) in the form of contour maps, seagrass sample grabs and spatially located video imagery.

## 2.1. Study Area

The Derwent Estuary covers an area of nearly 200 $km^2$ extending from New Norfolk to a line between Tinderbox and Iron Pot (Derwent Estuary Program, 2009). This report focuses on the upper Derwent estuary; in particular, on the seagrass banks from the Jordan River to Murphys Flats (see Figure 2). The seagrass habitats are characterised as “banks” as they are almost uniformly shallow (i.e. approx. 1 m depth), are generally covered in seagrass and form the banks of the main river channel itself. The term “bank” is consistent with other large flat elevated areas in intertidal and shallow subtidal areas e.g. Corner Inlet, near Wilsons Promontory, Victoria. The names of the seagrass banks are proposed to assist with communicating about the habitats in the area i.e. Dromedary Bank, Granton Bank, Jordan Bank, the two smaller Bridgewater Banks (east and west) and the Murphys Flat Bank.

## 2.2. Image acquisition

Imagery was required to, firstly, establish what ecological and environmental properties can be detected, and, secondly, to conduct a trial in time series analysis to evaluate the properties that are tractable to change detection. Two aerial photographic missions were conducted as follows:

1. 2009 June 2nd, two sets of images were obtained:
    a. Obliques images were captured in early winter in late afternoon with a relatively high tide using a digital SLR camera. Areas covered included Half Moon Bay, Ralphs Bay, Cornelian Bay and the upper Derwent sites including all the seagrass banks

shown in Figure 2. These photos were **geo-referenced** to the shores of the Derwent in the upper estuary and are used to visualise prominent features such as the bright green seagrasses on the Dromedary and Granton Banks.

   b. General oblique images useful for assisting interpretation of the main images.

   c. Mission cost approx. $1,000 (including planning)and image rectification cost approx. $900

2. 2010 February 19th, four sets of images were obtained:

   a. Vertical high resolution digital SLR images. These images were used to generate an **orthophoto mosaic** ("photo map") in Landscape Mapper version 1.4 using the Climate Futures LiDAR digital elevation model (DEM) to assist with relief distortion. The positional accuracy achieved is high at ~1 m.

   b. Vertical **infrared** and vertical **natural colour** imagery with high quality Canon G10 compact cameras. These images were used to produce an infrared image mosaic. The horizontal accuracy was les that the main orthophoto mosaic and is considered useful for assisting with image interpretation. The bright green and emergent vegetation shows up well in this sort of imagery.

   c. General oblique images in infrared (see Figure 1) and natural colour useful for assisting interpretation of the main images.

   d. Mission cost approx. $1,200 (including planning) and image rectification cost approx. $1,500

Other complementary imagery was collated and obtained at low or no cost (in chronological order):

3. 2010 January 30th: Rapid Eye satellite imagery purchased by the NRM Regions of Tasmania for environmental management purposes. The imagery has five bands including a "red edge" and near infrared band and a 5 meter ground pixel. This imagery was mostly used as backdrop imagery for the map making, but also makes a contribution to the time series analysis.

4. 2009 September 28th: a small screen grab of GeoEye satellite imagery over the Dromedary Bank was obtained from Google Earth and used to visualise the banks under flood conditions. The water is turbid with suspended sediments.

5. 2008 March 19th: Air photos from Google Earth extracted as screen shots and georeferenced in ArcGIS for visual comparison purposes. Much effort was made to find the owner of these images but all leads were exhausted. These images are the best though-water images for the middle and lower Derwent estuary as they were captured when the water was particularly clear. The series does not cover the Dromedary Bank.

6. 2003 October 13th: Quickbird satellite imagery from the widely available Greater Hobart mosaic was used as part of the time series work. Unfortunately, the imagery was captured at a time when the water was relatively dark and many underwater features are obscured, though substantial useful information was still captured.

7. 2001 January 3rd: TASMAP, ILS produced orthophotos licensed to the Derwent Estuary Program. These photos have little underwater detail and are mainly used to assist with locating the other imagery and the shoreline. A small amount of underwater information was extracted for the time series. Base image by TASMAP, © State of Tasmania

**Figure 1 Oblique infrared image of the Dromedary Seagrass Bank and Dromedary Marshes looking up river to the west. Vegetation generally shows up brightly in infrared images.**

## 2.3. Field data acquisition

Field trips to collect *in situ* observations and spatially located photos were conducted on the following dates:

| Date | Transport | Personnel | Comment |
|---|---|---|---|
| 2009-01-13 | Car and foot | Jason Whitehead | Shore based observations of seagrass and epiphytes |
| 2009-04-30 | Car and wading | Richard Mount and Mark Morffew | Shore based observations of seagrass and epiphytes |
| 2010-02-13 | Kayak (sounder, GPS and underwater camera) | Richard and Marylyn Mount | Mainly the Dromedary Bank to capture observations close to anticipated Flight 2 |
| 2010-02-28 | Kayak (sounder, GPS and underwater camera) | Richard and Marylyn Mount | Mainly the Granton Bank (west) to capture observations closely following Flight 2 |
| 2010-03-13 | Kayak (sounder, GPS and underwater camera) | Richard Mount and Gerald Harwood | All banks to capture observations closely following Flight 2 |
| 2010-12-31 | Kayak (sounder, GPS and underwater camera) | Richard and Marylyn Mount | Capturing observations of the Granton Bank (east) |

Most of the spatially located imagery is available at <http://picasaweb.google.com/dep2utas>

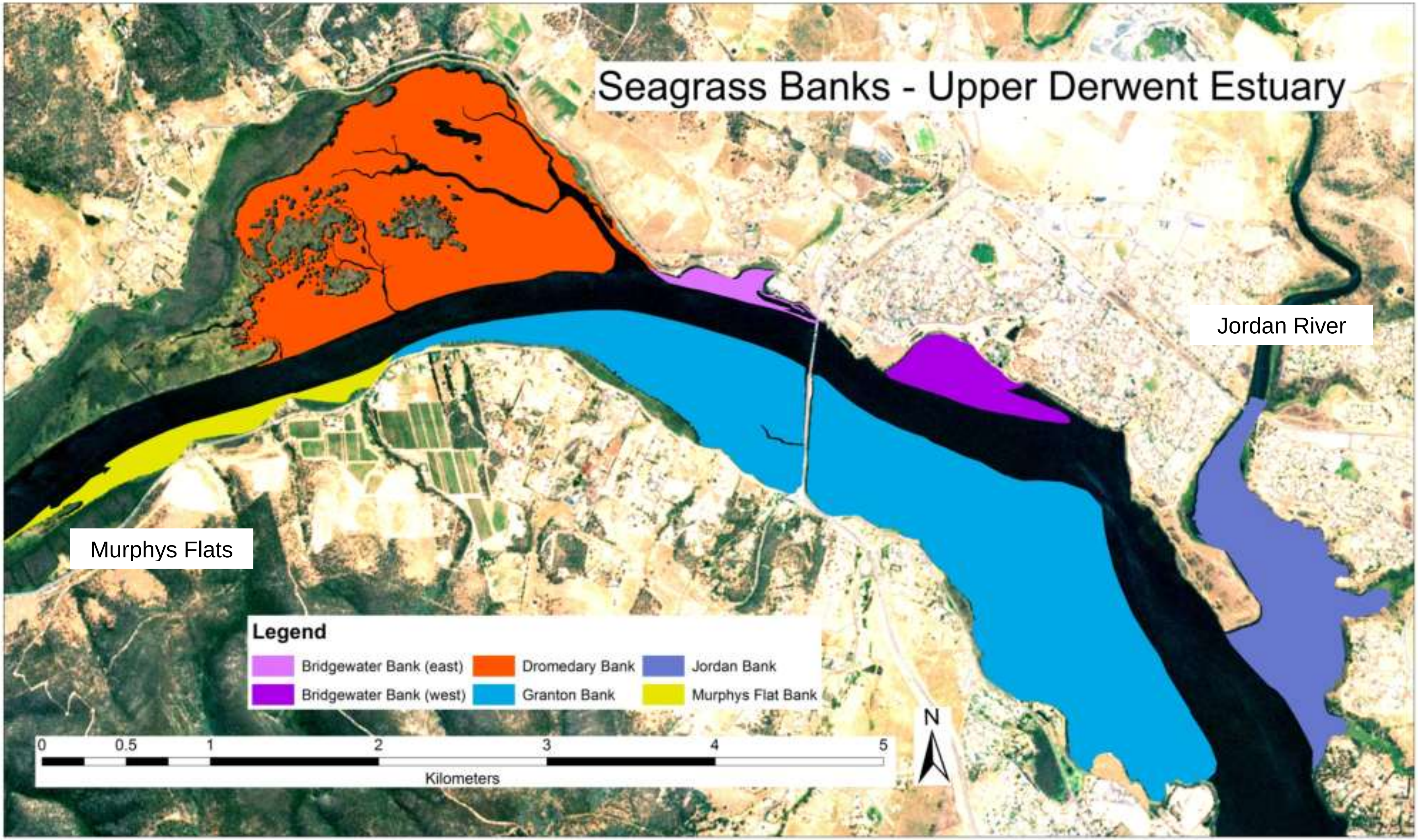


**Figure 2 The seagrass banks of the upper Derwent estuary. The names are proposed to assist with communicating about the habitats in the area.**

## 2.4. Mapping Classification Scheme

All mapping work requires a classification scheme that defines classes that are "fit-for-purpose". In this case, the key ecological features of interest are the submerged aquatic vegetation of the Derwent estuary, with a particular focus on the seagrasses. The classification scheme presented below is based on close analysis of the spatial imagery collected as well as field observations including visual inspections, underwater photographs, underwater videography (Lawler, 2009) and seagrass sample grabs (Lawler, 2009). It also draws on the following key reports, Roberts et al., 2001 and Lucieer et al., 2007.

### *Species*

The species of seagrass present in the study area are only partially known and there is some apparent disagreement between reported listings. The following reliable identification is from Roberts et al, (2001),

"Samples from a selection of sites used for autotrophic production (A1, A3, B3, C3 and D1) were collected in November and examined at the Tasmanian Herbarium, University of Tasmania by Dennis Morris. All the samples with *Lepilaena* present (B3, C3 and D1) were of one species, *Lepilaena cylindrocarpa*. *Ruppia* was present at all sites sampled. However due to a lack of flowers, a positive identification could only be made at site D1 of *Ruppia megacarpa*. The unidentified *Ruppia sp.* in the other samples was most probably *Ruppia polycarpa* based on the leaf morphology and distribution, but may alternatively be *Ruppia maritima* (Dennis Morris, Tasmanian Herbarium, Uni. of Tasmania, pers.com.)." The sites listed are in the upper Derwent estuary within the study area apart from A1 and A3 as per Figure 3.

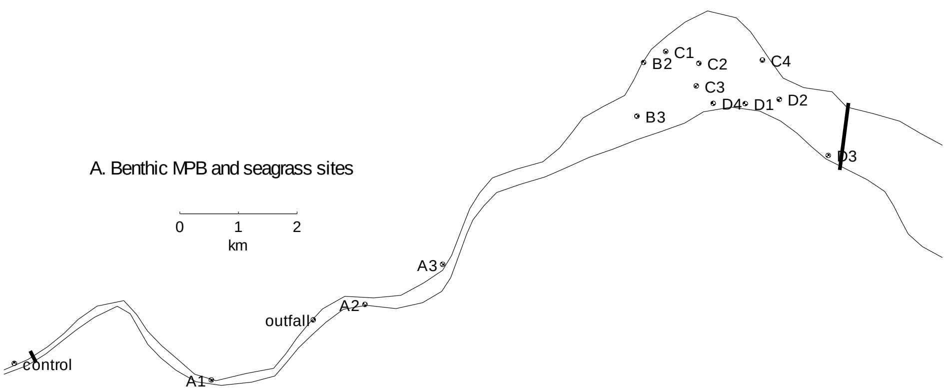


**Figure 3 Seagrass sample site in Roberts et al. 2001.**

The same report lists a *Zostera* species (i.e. an "eelgrass") as being the other main seagrass present, however other authors consider that the other main species present is a *Heterozostera* species. Lawler (2009) discusses this issue and notes that it is difficult to distinguish between *Zostera* and *Heterozostera* species in the field as they resemble each other closely. Further, there have been recent changes in the taxonomy of *Heterozostera* (Kuo, 2005) and Lawler (2009) considers that there may be two species present, *H. tasmanica* and *H. nigricaulis*. In general the seagrasses will be referred to in this report by their genera names, i.e. *Ruppia, Lepilaena* and *Heterozostera*.

### *Classification Scheme*

The mapping methods used for this study are unable to definitely distinguish separate seagrass species and an alternative set of classes is required. Based on close observations of the available data and habitats in the field the following classes are proposed:

**Table 1 Classification Scheme class descriptions**

| Class | Comment |
|---|---|
| Bright submerged aquatic vegetation (BSAV) | Areas of very bright, light green foliage of either *Lepilaena cylindrocarpa* or, most likely, *Ruppia spp.* These appear to be actively growing, fresh leaves and are typically close to the water surface (see Figure 4). |
| Dark submerged aquatic vegetation (DSAV) | Areas of dark green foliage. Species could include *Lepilaena cylindrocarpa, Ruppia spp.* or *Heterozostera spp*., though generally these areas are dominated by *Ruppia spp.* This foliage may be close to the surface or occur at depths down to, typically, 1-2 m. |
| Rhizome mat | Areas generally devoid of a seagrass canopy, but with the muddy substrate filled with rhizomes and stems. (Note: This class is not always easy to distinguish from bare mud or from DSAV) (see Figure 5) |
| Bare mud | Areas of "bare mud", that is without seagrass and or dense rhizomes |
| Channel | The main river channel is distinguished by its size, steeply sloping banks and depth. The smaller channels draining the seagrass banks. |
| Marsh | Areas of marsh including saltmarsh, tidally influenced marsh and freshwater marsh. See Prahalad et al (2010) for details of the species. |
| Scrub | Areas of woody shrubs, generally occurring inland of the marshes. See Prahalad et al (2010) for details of the species. |

**Figure 4 Bright submerged aquatic vegetation (Granton Bank)**

**Figure 5 Typical rhizome mat, note the roots and rhizomes (Dromedary Bank).**

## 2.5. Data Model and metadata

This data model and dictionary details the attribute fields used in the Upper Derwent Estuary Submerged Aquatic Vegetation (SAV) Habitat Map.

The somewhat cryptic field names used for each attribute field are designed to be compatible with some formats which allow only limited field name lengths. Each geomorphic attribute is recorded within the attribute table in two formats, as both a numerical (character string) code, and as an equivalent verbal descriptor. This allows greater flexibility in using the map and analysing map data.

**Dataset name**: Upper Derwent Estuary Submerged Aquatic Vegetation (SAV) Habitat Map 2010, version 1

**File name:** derwent_upper_est_habmap_2010_02_19

**Co-ordinate System:** Australia Map Grid Zone 55 GDA 1994

**GIS data type:** Vector polygon map, as ESRI shapefiles

**Description:** Polygon vector map

**Data Dictionary:** (see Table 2)

## 2.6. Aerial imagery time series method

For this study, the purpose is to identify feasible and practical information products based on remote sensing that can support environmental surveillance, inventory and monitoring of submerged aquatic vegetation (SAV). To this end, the aerial imagery time series methodology is based on that described in Mount (2007). This method has been applied in Vitoria by Ballet al. (2006) and Ball and Blake (2007). It was recently applied in Mount and Otera (2011) for Kingborough Council in North West Bay (Mount and Otera, 2011). Essentially the method entails identifying specific areas, or "megaquadrats", and using them to compare spatially located imagery through time. The use of a fixed spatial reference area (i.e. the megaquadrat) enables improved visual comparisons of time series imagery and, if required, can support quantitative analysis as well.

For this exploratory study, a visual comparison was conducted. The megaquadrats were positioned where a mix of habitat types are present with some evidence of change visible. The size of the megaquadrats should be varied depending on their application. For this study, three megaquadrats are used and they range between 24 and 90 Ha each (i.e. sides of 400 m to 1,200 m). In the future, other megaquadrats can be selected and time series analysis conducted relatively quickly now the spatial database is in place.

The imagery that can be used with the method can be any imagery taken from above including via:

1. Satellite imagery
2. Aerial photography of all sorts and scales
3. Kite or balloon photography
4. Remote controlled autonomous aircraft (e.g. Oktocopter)
5. Pole photography (e.g. 6 m carbon fibre pole)

Image types can be grayscale, colour, multispectral (including near infrared) or hyperspectral. For this study a range of image types were acquired (see Section 2.2) with a relatively limited date range of 2001 to 2010. Each image within the megaquadrat can be visually inspected for the variables of interest and compared to the other times. More detailed work could be done by mapping or conducting image analysis on each image in the time series and extracting quantified variable for comparison.

**Table 2 Data dictionary for the Upper Derwent Estuary SAV map**

| Field | Type | Width | Attributes | Comments |
|---|---|---|---|---|
| Habmapdesc1 | string (text) | 40 | dark submerged aquatic vegetation; bright sav rhizome mat; bare mud; marsh; scrub; channel; land; bridge; unknown. | Descriptions of the land cover and habitat types |
| HabmapCode 1 | string (text) | 10 | DSAV;BSAV;RZMT; BMUD;MRSH;SCRB;LAND;BRDG;CHNL;UNKN. | Codes for the land cover and habitat types in the same order as the descriptions |
| Habmapdesc2 | string (text) | 40 | vegetated (submerged); unvegetated (submerged); vegetated (onshore); channel; land; unknown. | Simplified descriptions of the land cover and habitat types |
| HabmapCode 2 | string (text) | 10 | SAV; UVEG; VEG; CHNL; LAND; UNKN. | Codes for the land cover and habitat types in the same order as the descriptions |
| SMSub1Desc | string (text) | 20 | Reef; Cobble; Sand; Silt; Seagrass; Aquatic Macrophytes; Vegetated | Descriptions of the land cover and habitat types |
| SMSub1Code | string (text) | 10 | RF; CB; SA; SI; SG; AQ; VEG | Codes for the land cover and habitat types in the same order as the descriptions |
| SMSub2Desc | string (text) | 20 | Reef; Unvegetated; Seagrass; Aquatic Macrophytes; Vegetated | Simplified descriptions of the land cover and habitat types |
| SMSub2Code | string (text) | 20 | RF; UNVEG; SG; AQ; VEG | Codes for the land cover and habitat types in the same order as the simplified descriptions |
| **Metadata:** | | | | |
| Created | Date | - | Date of data currency or last update, appearing as "DD/MM/YYYY" | Refers to the date the polygon was drawn |
| Authors | string (text) | 75 | Name of the authors | Refers to the polygon authors |
| ImageSourc | string (text) | 250 | Provides a range of information including name of the person who captured the mage image capture, when and with which camera or sensor. Also information about the orthorectification method and accuracy. For example, "Richard Mount and Stewart Wells / Feb 19, 2010 / Canon Eos 5D / 5500 feet / Orthorectified with LiDAR, RMS less than 1 metre" | Refers to the image authors and other characteristics |
| FieldTrip | string (text) | 20 | Indicates the date of the field trip to acquire the imagery, appearing as "DD/MM/YYYY" | Indicates the date of the field trip to acquire the imagery |

Typically variables that could be extracted include:

1. Changes in location and extent of target habitats
2. Changes in habitat types or properties such as species, structure, vegetation density (percent cover), epiphytic loading or the deep edge of seagrass beds
3. Geomorphological changes such as changes in channel positions

## 2.7. Water surface imagery time series method

Photo transects captured by a camera at or immediately below the water surface is a low-cost method that could be used to monitor submerged aquatic vegetation in some selected locations by building a time series photo library that can be queried spatially. The method can be applied in a number of ways depending on the purpose and the environmental conditions at the target site.

Purposes could include:

1. Inventory
    a. seagrass species
2. Surveillance
    a. invasive species
3. Monitoring
    a. seagrass density (percent cover)
    b. epiphytic growth

Useful approaches could include wading or using shallow water craft e.g. kayak. There are many waterproof cameras now available that would be suitable. A GPS should be used to position the imagery – simple methods now exist (e.g. EasyGPS software) for geo-locating imagery. All spatially located imagery can be easily shared on the web via sites such as Picasa Web albums or Flickr. These sites allow users to view the imagery for specific locations via a map interface. For example, the imagery collected for this study is available at <http://picasaweb.google.com/dep2utas>.

The water surface imagery time series methodology is in a nascent state of development, though could be easily operationalised. The **wading** approach taken here was to trial wading into the sea at selected sites and taking downward pointing photos with a digital SLR from chest height. It is important to reduce surface glare and to maximise through-water penetration.

### *Water surface image capture wading procedure*

A draft ideal procedure could be as follows:

1. Identify selected sites. Choices need to be made about
    a. The purpose of the photo monitoring
    b. Fixed or random positioning of transects
    c. Safety considerations e.g. firm sediments only for wading; wader safety training.
2. Equipment needed:
    a. Camera (ideally waterproof so underwater shots can be obtained)
    b. GPS (ideally a differential GPS, but that is not necessary); one that can have its tracklog and waypoints downloaded to a computer.
    c. Depending on the water temperature, waders and/or warm clothes
3. Prepare the camera and GPS
    a. Use a polarising filter if available
    b. Set the camera time to GPS time (if using a GPS)
    c. Check the coordinate system in the GPS is suitable (probably MGA GDA94 or similar; WGS84 is probably OK too)
    d. Ensure the camera and GPS stay close together (within a metre or so) throughout the shoot.

4. Image capture
    a. Sunny, still conditions are best and a low tide helps too.
    b. Take some locating shots of the surroundings
    c. Take a photo of the GPS (helps with synching the time later on)
    d. Start taking photos of the sea floor, minimising glare and checking that the photos are coming out well. You may have to adjust the exposure values (e.g. open up the shutter or slow the shutter speed as the bottom may be relatively dark). Take some photos from below the water surface if your camera is suitable. It is fine to include your feet in the image as this can provide a size reference.
    e. Depending on the sampling strategy, walk slowly into deeper water and take photos as you go – perhaps every 5-10 metres.
    f. When you are as deep as you can go, turn around and take some more locating shots, then keep taking more sea floor photos on the way back in.
5. Image processing
    a. Download the images and the GPS tracklog to a computer
    b. Write the locational information into the image header file somehow (e.g. using EasyGPS)
    c. You may choose to increase the contrast or otherwise process the images, but don't do too much to the originals.
    d. Upload the images to, an internet photo library archive e.g. <http://picasaweb.google.com/dep2utas>

A series of 4 **kayak** trips were made to collect data. The kayak was fitted with a Garmin GPSMap 176 GPS and sounder and recorded depth, temperature and position. A Canon G10 camera in an underwater housing was used to capture images both above and below the water surface and geo-located using the GPS tracklog. The procedure is much as for the wading procedure listed above apart from issues relating to management of the boat including boat safety.


**Figure 6 Kayak fitted with GPS and sounder**

# 3. Results

## 3.1. Mapping current habitat extent

The mapping effort in the upper Derwent estuary has produced a detailed habitat map in GIS format (see Figure 8). These maps are considerably more detailed over the shallow banks than the habitat mapping conducted, for example, by TAFI in the 2007 resurvey (Figure 9). This is because the TAFI method generally requires a boat with a sounder to pass over the habitat and this is not possible in water depths of a metre or less. The image based mapping used here is complementary to the TAFI approach as it can distinguish bottom features in the shallow waters though is limited by water clarity.

The areas of the **seagrass banks** are presented in Table 3 in size order and the Granton Bank is clearly the largest, though it is divided by the Bridgewater Bridge causeway. The shape of the channels draining the western end of the Granton Bank is driven by the causeway as the channels run down to the causeway and then turn a right angle and run alongside the causeway. Most other channels have a more natural form. Most of the banks exhibit a common morphological pattern of being deeper at their downstream end and often have a channel entering the bank from this end.

The Dromedary Bank shares a river bank platform with the Dromedary Marshes and there appears to be active colonisation of the seagrass bank by the saltmarsh species in the area including the *Juncus krausii* (Figure 7). For more detail on these marshes see Prahalad et al. (2009) and MacDonald (1995).

**Table 3 Areas of the seagrass banks**

| Bank Name | Area ($m^2$) | Area (Ha) |
|---|---|---|
| Granton Bank | 3,142,647 | 314.2 |
| Dromedary Bank | 1,926,148 | 192.6 |
| Jordan Bank | 867,059 | 86.7 |
| Murphys Flat Bank | 256,316 | 25.6 |
| Bridgewater Bank (west) | 240,211 | 24.0 |
| Bridgewater Bank (east) | 88,368 | 8.8 |

**Figure 7 *Juncus krausii* on the Dromedary Bank**

The **current extent of habitats** was mapped based on the January 2010 image mosaic and supplemented with the infrared imagery and field observations, especially the spatially located still underwater photos and the spatially located video provided by TAFI (Lawler, 2009). The boundary between some classes is not as "crisp" as that defined by the mapping polygons and subjective judgement needed to be used when placing the boundaries. For example, the boundary between the "rhizome mat" class and "dark SAV" is not always clear. Further field work would assist with clarifying the boundaries. Areas are reported in Table 4.

**Table 4 Areas of the habitat types. Note that the areas calculated for the channel, marsh and scrub classes are for the areas mapped only and are all truncated at the imagery boundary.**

| Habitat Name | Area ($m^2$) | Area (Ha) |
|---|---|---|
| bright submerged aquatic vegetation (BSAV) | 2,262,065 | 226.2 |
| dark submerged aquatic vegetation (DSAV) | 3,028,797 | 302.9 |
| rhizome mat | 1,252,057 | 125.2 |
| bare mud | 61,633 | 6.2 |
| channel | 4,260,724 | 426.1 |
| marsh | 1,338,497 | 133.8 |
| scrub | 2,145,395 | 214.5 |
| unknown | 156,450 | 15.6 |

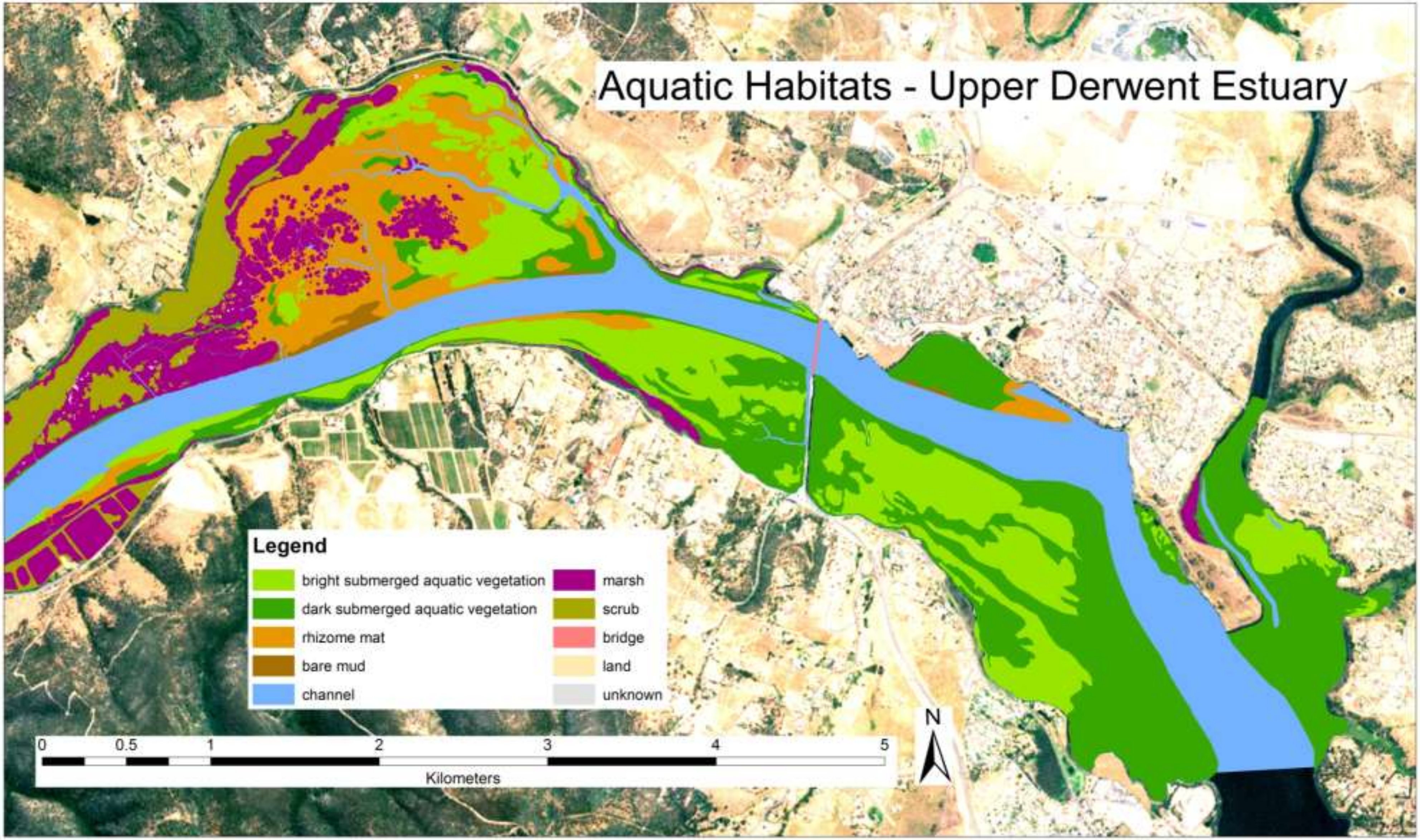


**Figure 8 Submerged aquatic vegetation mapping in the upper Derwent estuary 2010. The SAV is dominated by *Ruppia spp* with a band of *Heterozostera spp* along the main river channel in the west.**

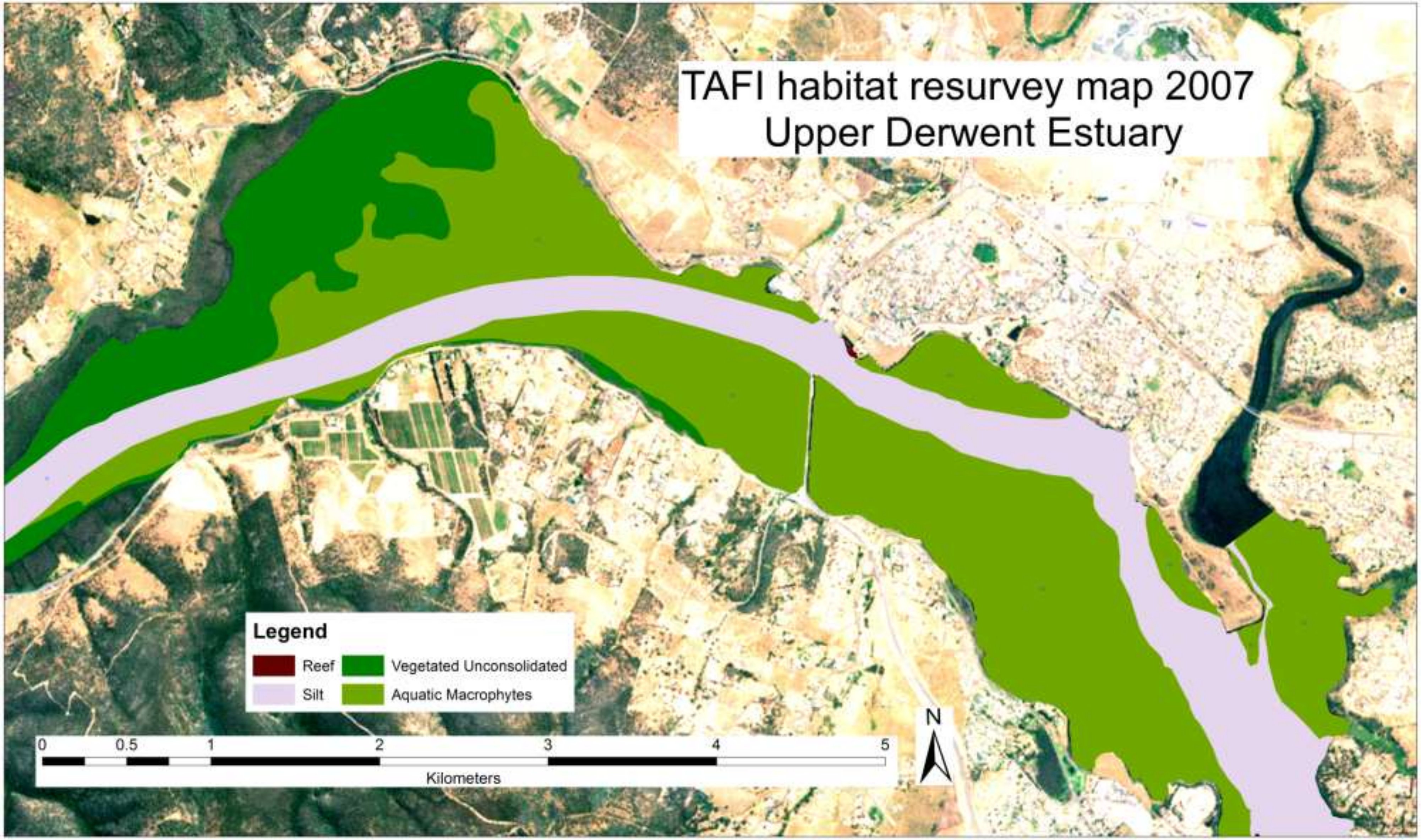


**Figure 9 Habitat mapping completed by TAFI in the 2007 resurvey of the Derwent estuary habitats**

## 3.2. Primary productivity

Based on published biomass figures for *Ruppia megacarpa* (Brock, 1983) and for a combination of *Ruppia megacarpa, Heterozostera tasmanica* and *Zostera muelleri* (Ierodiaconou and Laurenson, 2002) that range from ~100 to 380 gm $m^{-2}$, the total standing biomass ("standing crop") of the seagrass component of the combined SAV classes is in the order of between 500 and 2,000 tonnes. Given the generally low epiphyte levels found throughout the banks in the upper Derwent estuary (e.g. Roberts et al. 2001; Lawler, 2009; field observations), the total standing crop estimate for the seagrass and epiphyte combined is probably encompassed within the estimated range for seagrass (i.e. between 500 and 2,000 tonnes).

Based on the primary productivity rates calculated by Roberts et al. (2001) the production of carbon for the mapped banks is in the order of 26 tonnes per day in May and about 80 tonnes per day in November. Roberts et al. (2001) presented evidence that the seagrasses are the dominant primary producers in the study area by three or four times (see table below from Roberts et al. 2001). The high numbers of birds using the area for feeding and breeding corroborates this high level productivity (Figure 10). Up to 2,000 swans have been observed in the study area (pers. Comm. Stewart Blackhall, DPIPWE).

**Table 5 Comparison of gross primary productivity of the major groups examined. Data are the mean productivity values for each sampling trip expressed as mg C. $m^{-2}$. $h^{-1}$ assuming a PQ and RQ of 1. Phytoplankton and bacterial production are based on a depth of 2 m for surface water. (From Roberts et al., 2001)**

| Primary Producer | February | May | July | November |
|---|---|---|---|---|
| Phytoplankton | 2 | 5 | -- | -- |
| MPB (microphytobenthos) | -- | 65 | 103 | 158 |
| Seagrass | -- | 205 | 312 | 636 |
| Bacterial secondary productivity | -- | 14 (mean for May/July) | | |

**Figure 10 High numbers of animals graze on the seagrass itself (e.g. swans, ducks and yellow-eyed mullet) or on the animals and plants that live on or among the seagrasses (e.g. black bream, brown trout and short-finned eels).**

## 3.4. Aerial imagery time series analysis

The megaquadrat approach has been established in the project's spatial database and was used to produce three time series using the available imagery including the imagery captured for the project and a variety of other imagery including satellite, Google Earth and orthophotos. This approach enables a comparison of the performance of the various image types. The results for the three selected megaquadrats are presented in Figure 11, Figure 12 and Figure 13. Each time series uses different images either because their coverage did not coincide with the megaquadrat or it was not of suitable quality. Nit is important to note that the time series is relatively short and a there are three sources of 2010 summer images captured within 3 weeks of each other.

**Megaquadrat 1** time series (Figure 11) shows some gains and losses of bright green SAV (BSAV) through time. In particular, a gain from the 2003 spring Quickbird image to the 2008 summer airphoto, though note the poor quality of the Quickbird image. The difference could also be partly explained by the seasonal growth habit of *Ruppia*. In the 2009 winter and 2010 summer images there is a fairly stable extent of BSAV, perhaps with a slight thickening of the BSAV in the summer images, though note that the water in the 2009 winter image was dark and the tide was high. The 2010 summer RapidEye image shows some image "salt and pepper" effects that are artefacts in the available image and do not reflect the usual quality of the RapidEye images. There is a clear change in the SAV patch in the lower part of the megaquadrat with a change in the periphery of the SAV patch from BSAV to dark SAV (DSAV). This is likely to be a natural transition from fresh new foliage to older and, possibly, senescing foliage. This is a change that is apparent in all the megaquadrat time series.

**Megaquadrat 2** time series (Figure 12) indicates that there is little detectable change in BSAV extent from 2009 to 2010 other than a small increase in BSAV along the shores of the southern patch. Note that the river is in flood in the 2009 spring GeoEye image and that the water is bright and the seagrass banks are dark. Also note the foam streaks on the 2009 winter image caused by the katabatic winds. The 2003 spring Quickbird image is virtually useless, thought he tidal and main channels are visible. The 2001 summer orthophoto similarly does not provide much useful information and it is not clear whether the pale patches are SAV or a muddy bottom.

**Megaquadrat 3** time series (Figure 13) on the eastern side of the bridge shows large changes in the extent of BSAV. The three times that are included in change analysis are the 2003 spring Quickbird image, the 2008 summer AP and the 2010 summer images (i.e. natural colour and confirmation with the infrared). The 2010 summer Rapid Eye image was not used as it was both close in time to the 2010 summer image and also was less clear than the two airphotos on either side of it. The 2001 summer orthophoto is of poor quality and is only shown to illustrate the different image qualities. The changes are most obvious I the mid-right of the image where BSAV is firstly, present in 2003, then changes to DSAV in 2008 and then back again to BSAV in 2009. Along the bridge on the left side of the megaquadrat, the BSAV apparent in the 2003 spring image is still there in 2008 summer but has darkened in the 2010 summer image.

In summary, areas of gain and loss are apparent in the megaquadrats, though the time series is limited and the image quality is mixed.

## 3.5. Water surface imagery time series analysis

Imagery captured at or under the water surface can be used to monitor benthic habitats in the study area. Simple trials were conducted by both wading and by using shallow water craft (i.e. kayak). Both methods proved viable for the given environment, wading where the sediments are firm enough to support the weight of the observer, and kayaking where the water is deep enough to float the boat. The resulting imagery is available for viewing at <http://picasaweb.google.com/dep2utas>.

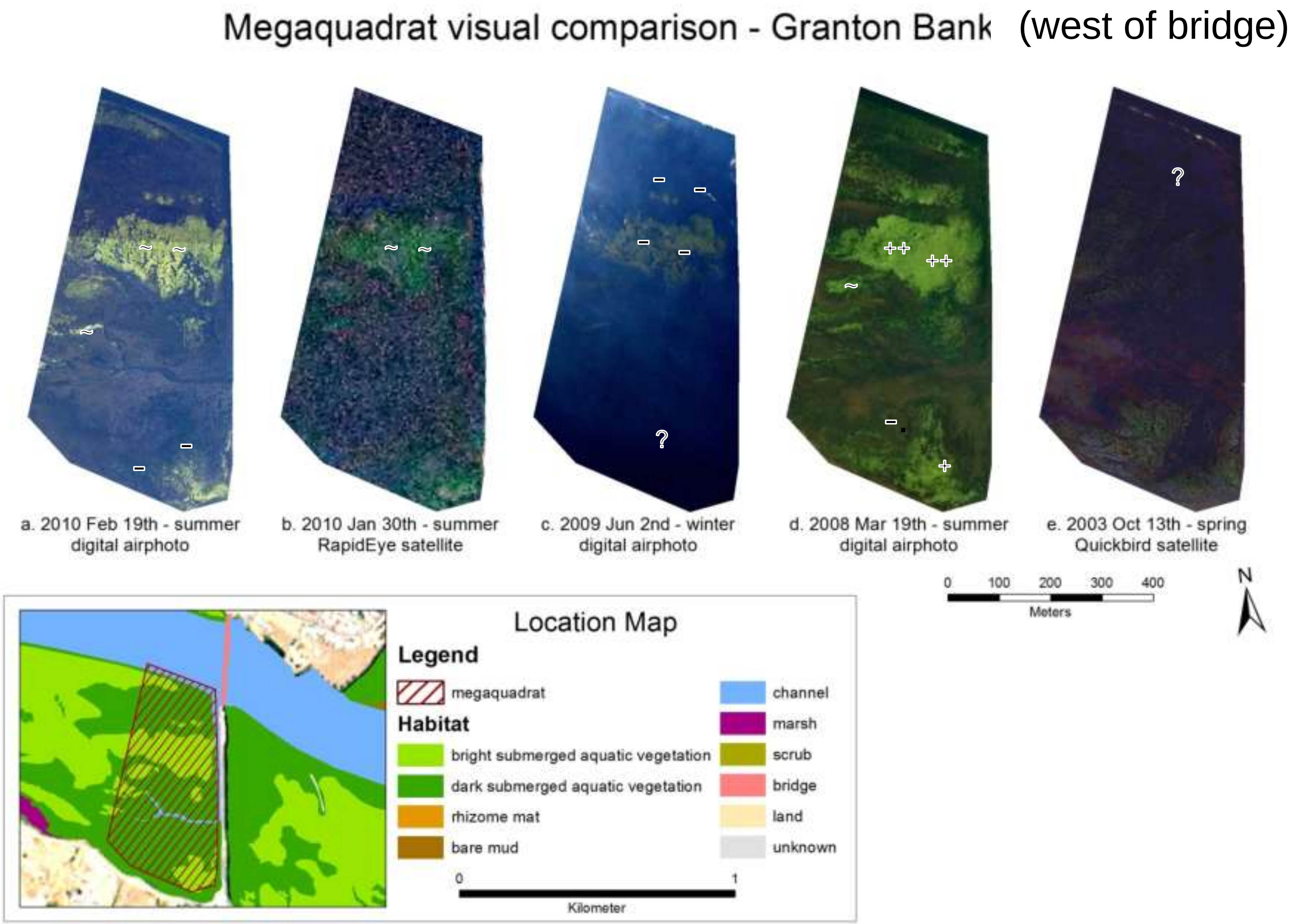


**Figure 11 Aerial imagery time series: Megaquadrat 1, immediately west of the Bridgewater Bridge on the Granton Bank. Starting at the oldest image, changes are represented by "++" = big increase in BSAV; "+" = moderate increase in BSAV; "~" = no obvious change in BSAV; "-" = loss of BSAV; "?" = uncertain.**

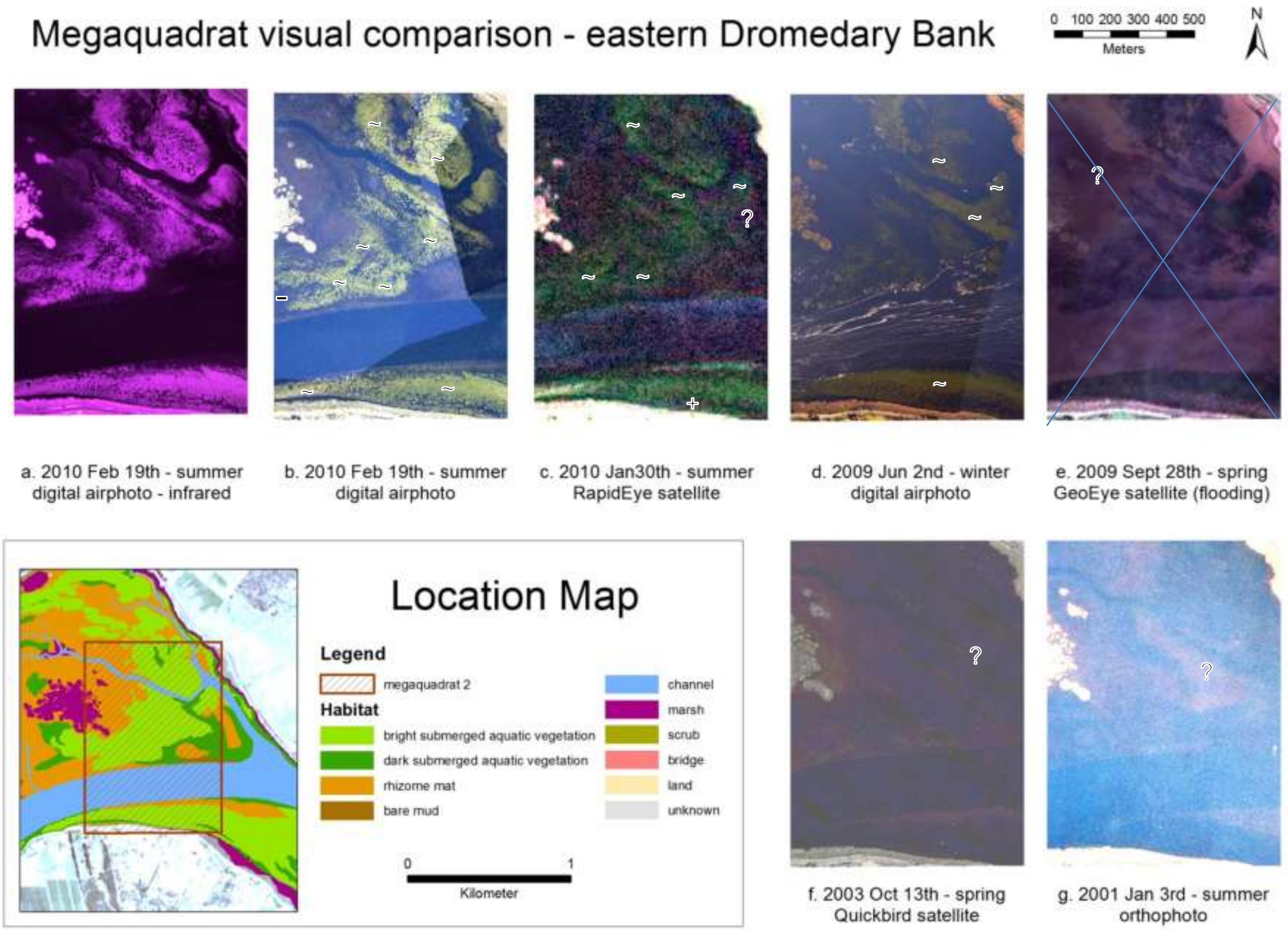


**Figure 12 Aerial imagery time series: Megaquadrat 2, eastern end of the Dromedary Bank. Note the 2009 GeoEye satellite image was captured during a flood. Starting at the oldest image, changes are represented by "++" = big increase in BSAV; "+" = moderate increase in BSAV; "~" = no obvious change in BSAV; "-" = loss of BSAV; "?" = uncertain.**

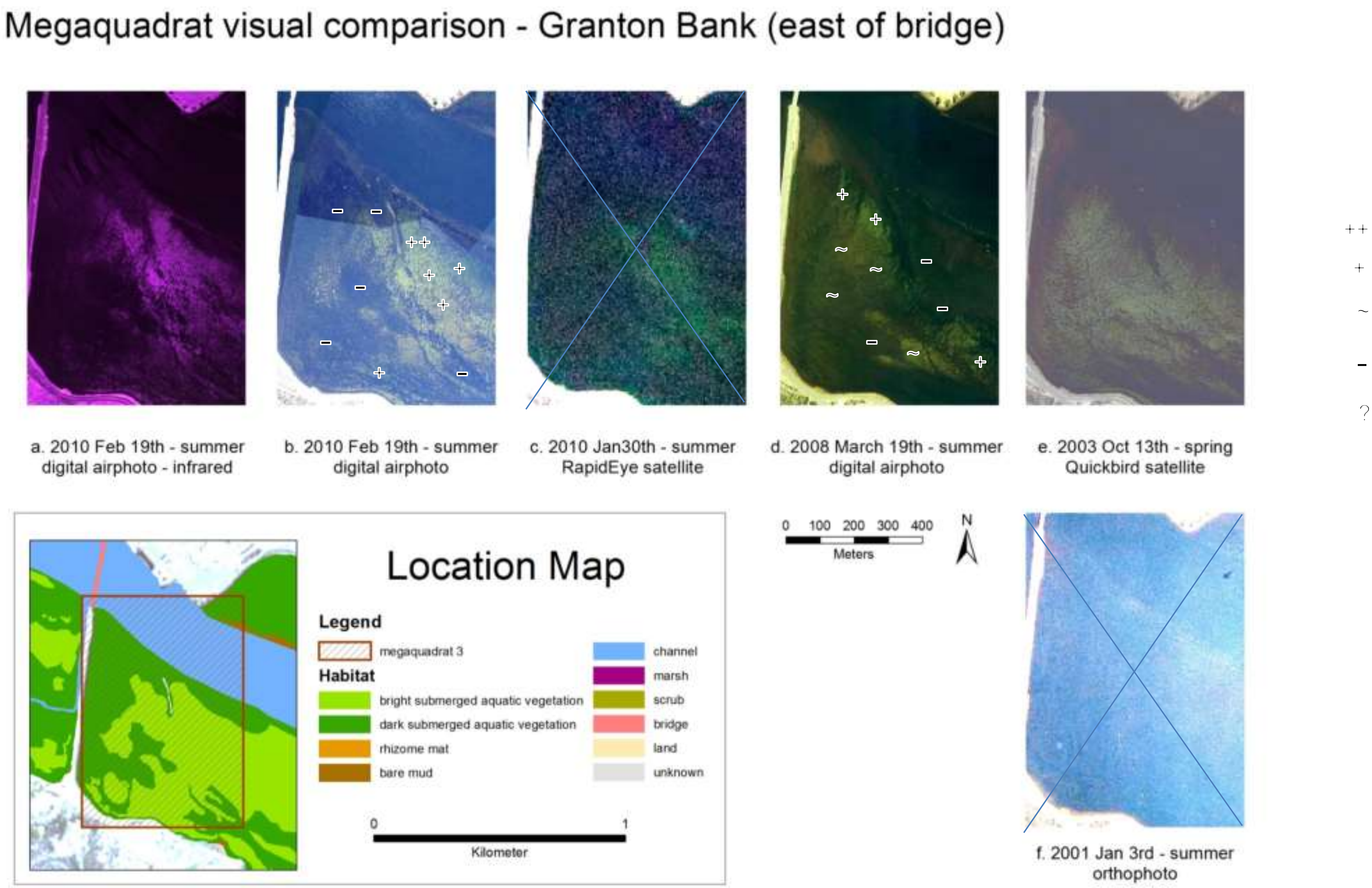


**Figure 13 Aerial imagery time series: Megaquadrat 3, immediately east of the Bridgewater Bridge on the Granton Bank. Starting at the oldest image, changes are represented by "++" = big increase in BSAV; "+" = moderate increase in BSAV; "~" = no obvious change in BSAV; "-" = loss of BSAV; "?" = uncertain.**

# 4. Discussion

## *Bright green SAV monitoring*

The reported areas in Table 5 show that the shallow seagrass banks are dominated by seagrass, primarily *Ruppia spp*. The bright green SAV has been mapped separately as it is, generally, clearly distinguishable from the other classes and it may be an indicator of key ecological processes, though this needs to be confirmed by a wetland ecologist or similar. It is possible to monitor the amount of fresh bright green growth in the area and gain some insight into the environmental conditions over the seagrass beds. For example, Roberts et al. (2001) provide evidence that the seagrasses are nutrient limited, and changes in nutrient levels may be reflected in seagrass growth rates. Direct browsing by swans is another significant influence on the structure of the seagrass canopy, though it is notable that the swans appear not to occupy the densest bright green patches (e.g. see Figure 10).

## *Light availability*

Given that the seagrasses are generally occupying very shallow water and are often emergent, it may be reasonable to assume they have good access to light as there is very little water column over them. This may be the case even if water clarity is low due to CDOM or suspended particle. Roberts et al. (2001) also noted that the seagrass species here are well adapted to both low light conditions (e.g. winter) and high light conditions (e.g. summer). It may be that much of the seagrass on the banks of the upper Derwent is not particularly light limited. Another established mechanism for limiting light availability for seagrass is that of shading by epiphytic algae, where thick mats of filamentous algae grow over the seagrass, eventually killing it. Given the low levels of epiphytes observed over the seagrass banks (e.g. Lawler, 2009), this mechanism appears not be a major concern at the time of mapping.

## *Seagrass "pools" habitat*

A habitat type that was not mapped, but could be extracted from the imagery if it was useful to do so is that of the seagrass "pool" habitat. This is where there are openings in very dense seagrass canopies measuring between about 2-20 metres across (Figure 14). The pool depth is typically down to the substrate and during the field trip on the 13$^{th}$ March 2010 the pools were frequently observed to have hundreds of fish in each one (Figure 15).

**Figure 14 Example of seagrass "pool" habitat on the Granton Bank (east) indicated by the orange circle. The image is about 700 m across and the orange circle is about 170 m across.**

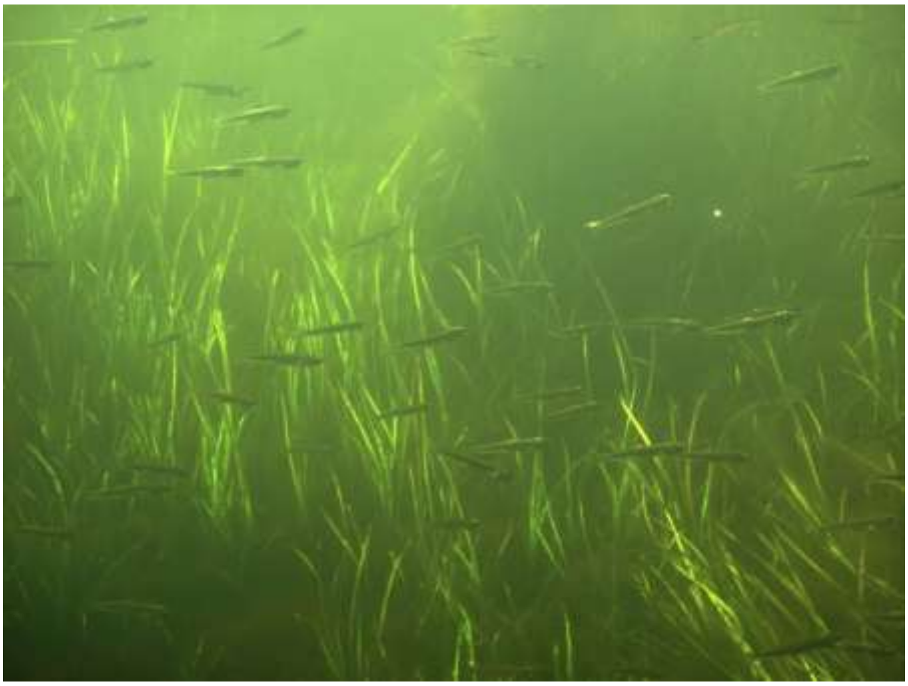

Figure 15 Example of small fish found in the seagrass pool habitat.

## Changes in benthic cover extent for biomass estimation

The benthic cover of the seagrass banks can clearly be monitored if the quality of the imagery is adequate. The area estimates enable the calculation of biomass (i.e. "standing crop") if biomass estimates can be related to the mapped habitat classes. Ierodiaconou and Laurenson (2002) calculated the standing crop of the seagrasses in the Hopkins Estuary, Victoria by using ground survey methods to do the mapping and harvesting seagrass in quadrats to estimate the biomass. The entire area of the seagrass in the estuary was 40 Ha and the entire estuary is 160 Ha. The upper Derwent estuary seagrass banks are more than an order of magnitude larger and require a more efficient method of mapping for habitat change and biomass estimation purposes. This trial indicates that low-cost image capture is capable of supporting such estimates.

## Changes in tidal channel morphology

The tidal channels are an important component of the seagrass banks as they enable the flow and circulation of water and provide access to the middle of the banks for marine organisms. They are often deep and well defined (e.g. Dromedary Bank). The position and shape of these channels could be monitored with high resolution through-water imagery.

## Limitations of the approach

It is important to be realistic about the limitations of any sampling approach. The following is a discussion of what didn't work and what to avoid in the future.

The number of flying days was limited by the weather, particularly during the winter and spring of 2009 due to extremely high rainfall levels making the water particularly turbid. Further complications were provided by the very strong katabatic winds (i.e. cold air drainage @ ~20 knots) present in the mornings in winter and spring and also the sea breeze, which penetrated right up to Bridgewater by about 4:00pm in the afternoon in summer. Though these were a problem, on close inspection of the winter 2009 imagery, the bright green SAV is still visible due to its close proximity to the surface and also to the excellent capacity of the SAV to damp the effect of any waves in the water surface (Figure 16) and also trap most of the foam streaks generated by the waves (Figure 17).

The imagery could not be used to determine the following:

- The deep edge of the seagrass beds, mostly due to the steep channel banks and low-contrast bottom types at the maximum depths of seagrass growth.

- Seagrass density (percent cover), mostly due to the growth habits of the species present (i.e. generally only grows in high densities with long leaf lengths), the dark water and the low contrast between the seagrass and the bottom.
- Patchiness (spatial metrics), due to the largely contiguous and consolidated form of the seagrass beds. The simplest forms of spatial metrics (i.e. changes in area) are all that is needed here

**Figure 16 The SAV provides excellent damping of the wind waves, even in strong wind.**

**Figure 17 The katabatic winds (caused by cold air drainage) generate waves and foam streaks. The latter are visible in this image. Note that the foam streaks generally do not enter the areas of bright SAV.**

# 5. Conclusions and Future Work

New through-water imagery was collected with low-cost digital cameras and using light fixed-wing aircraft, and then processed with high-precision LiDAR data to produce very accurate high-resolution photo maps (orthophotos) that clearly show subsurface features of ecological significance. There needs to be some field observations collected to ensure the quality of the image interpretation, but this can be effectively carried out using light, low-cost methods such as spatially-located water-surface image capture from shallow water craft, such as kayaks. The trial of the methods has shown that the approach to collection of new through-water imagery is feasible and practical.

The maps produced from the project imagery within the spatial database are the highest resolution maps of the seagrass beds known to date. The spatial database was used to produce megaquadrat based time series that were used to detect changes in submerged aquatic vegetation condition (i.e. changes from fresh bright green to darker, more mature foliage). Water surface imagery was also collected and geo-located, partly for the purpose of assisting the interpretation of the aerial imagery, but also to trial the efficacy of water surface imagery for photo monitoring. The following comments are intended to assist with forward planning.

## 5.1. Aerial imagery - future

There are a number of options that appear most useful for the acquisition of aerial imagery in the future, as follows:

1. Low-cost light fixed-wing aircraft with a floor port allowing the use of digital SLR cameras. For example, Stewart Wells is capable of capturing imagery over the Derwent on an opportunistic basis when conditions are favourable. The advantage of this approach is that it maximises the coverage and can be timed to take advantage of good weather and water clarity conditions. The new images could be orthorectified within the current spatial database at low cost.
2. Low-cost meso-scale imagery such as that captured from remote controlled aircraft such as the Oktocopter. An example of the imagery is provided in Figure 18. This approach could be used to directly capture target megaquadrats.
3. Satellite imagery as it becomes opportunistically available, though occasional purchases of carefully selected images may be worthwhile at times.

**Figure 18 Example of the high-resolution, but limited coverage Oktocopter image mosaic showing patchy seagrass. Clarkes Beach, North West Bay, 31 December 2010. Image is approximately 250 m across.**

## 5.2. Aerial imagery - past

Given the feasibility of using spatially imagery for mapping and monitoring submerged aquatic vegetation in the upper Derwent estuary, but also given the limited time series that was available for this project, it is worth considering making more use of the aerial photography archive. The archive holds imagery back to the mid-1940s through to the present day. An (incomplete) search of the aerial photos of the upper Derwent estuary for the 1940s, 1980s, 1990s and 2000s shows that there are around 700 images available (see listing in Appendix 3). This suggests that there are about a 1,000 images potentially available.

A rapid low-cost assessment method was developed by Mount and Otera (2011) for assessing such large number of images. It is almost certain that there will be a large number of useful historic aerial photos that will be able to assist with determining the rate and extent of changes in the seagrasses banks of the upper estuary.

## 5.3. Photo point monitoring

The photo monitoring procedures need to be tested and a simple photo library system established that supports analysis of the seagrass. Sites need to be identified and training of suitable image collectors conducted.

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# Appendix 1. SAV Remote Sensing Project Plan

**Project Aims:**

1. **This project is designed to collect spatially referenced remote sensing imagery to support the** environmental surveillance, inventory and monitoring of submerged aquatic vegetation (SAV), in particular, targeting seagrass in the upper and mid Derwent estuary.
2. The imagery will be used by the Consultant to produce inventory and monitoring information products including, where the imagery permits changes in location of deep edges, seagrass density (percent cover) and patchiness (spatial metrics).
3. If resources allow the following additional assessments will be undertaken: ii) microphytobenthos (MPB) in the upper estuary, iii) MPB throughout sandflats within greater Ralphs Bay, iv) seagrass at South Arm (notably Halfmoon Bay), and v) Macrocystis (giant kelp) along the eastern Tinderbox Peninsula and Iron Pot areas.

**Objectives**

In particular,

1. The project will provide digital still images that are tied to geographical location.
2. The image capture flights will occur in each of the seasons occurring within the term of the agreement, if environmental conditions (i.e. cloud and water clarity) permit.
3. High resolution (0.5-2 m ground resolution pixels) digital still images will be acquired over the target locations designated by the DEP in agreement with the Consultant.
4. The imagery will be used by the Consultant to produce inventory and monitoring information products including, where the imagery permits, changes in location of deep edges, seagrass density (percent cover) and patchiness (spatial metrics).

**Stages**

1. It is proposed that the project consists of two stages, which will both be developed in conjunction with the DEP.
2. Stage One (to commence by 13 April 2009) consists of flight planning and implementation with the goal of capturing high resolution georeferenced digital still images to meet the project requirements. The target locations are to be decided in consultation with the DEP, and initially focus on i) seagrass and ii) MPB (pending ROCU access to an infra-red camera) in the upper and mid estuary. If resources allow the following additional assessments will be undertaken in subsequent steps within Stage One: iii) MPB throughout sandflats within greater Ralphs Bay, iv) seagrass at South Arm (notably Halfmoon Bay), and v) Macrocystis (giant kelp) along the eastern Tinderbox Peninsula and Iron Pot areas.
3. Stage Two will deliver geolocated high resolution georeferenced digital still images of the target locations in a form ready to be used for DEP purposes. The information products will be generated via image processing including digitising and image classification according to the methods described in Mount, 2006 and making use of the data supplied by the SEAMAP Tasmania Program, TAFI.
4. The results will be provided to the DEP after each flight so that the approach can be adapted to best suit the DEP's requirements. A final report will be produced summarising and interpreting the results.

**Deliverables**

1. **Seagrass Monitoring Work Plan**. This is a plan showing the designated target sites, and all other details of the data collection operation including flying heights, ground coverage, ground resolution units, ground control locations, specifications of weather and water conditions during the flights, and sensor instrumentation.
2. **Remote sensing products**. The original and geolocated digital aerial imagery captured during the flights.
3. **Derived spatial information products**. These are inventory and monitoring digital information products including, where the imagery permits, changes in location of deep edges, seagrass density (percent cover) and patchiness (spatial metrics).
4. **Final Project Report**. A final report summarising and interpreting the project results.

# Appendix 2. SAV RS Monitoring Flight Plan

UTAS-DEP SAV Monitoring Work Plan

Richard Mount, UTAS

**Project Aims:**

1. **This project is designed to collect spatially referenced remote sensing imagery to support the** environmental surveillance, inventory and monitoring of submerged aquatic vegetation (SAV), in particular, targeting seagrass in the upper and mid Derwent estuary.
2. The imagery will be used by the Consultant to produce inventory and monitoring information products including, where the imagery permits changes in location of deep edges, seagrass density (percent cover) and patchiness (spatial metrics).

**Image Capture Strategies:**

1. The image capture flights will occur in each of the seasons occurring within the term of the agreement, if environmental conditions (i.e. cloud and water clarity) permit.
2. When water clarity is limited and, therefore, the deep edge data is not available the imagery will target the shallow flats and banks with a view to obtaining patchiness
3. High resolution (0.5-2 m ground resolution pixels) digital still images will be acquired over the target locations designated by the DEP in agreement with the Consultant.

**Light Plane Flight Plan**

a. Crew

- Plane – Par Avion Cessna 206
- Pilot – Greg Wells, Par Avion
- Navigator – Mark Morffew or Darren Turner or Samya Jabbour, UTAS
- Camera Operators – Stewart Wells and Richard Mount

b. Locations

- Primarily along the large SAV beds around Bridgewater-Granton-Austins Ferry
- Secondarily, at other locations, as time and resources permit

c. Camera options

- Stewart Wells digital camera, Canon EOS 5D (RGB)
- Richard Mount digital cameras, Canon G10 (RGB and Near Infrared, NIR)

d. Ground Pixel Size

- Flying Height ~1,524 m (5,000’) asl => ~0.36 m
- Flying Height ~3,048 m (10,000’) asl => ~0.7 m

e. Image Dimensions

- Flying Height ~1,524 m (5,000’) asl => x = 1,559 m; y = 1,041 m
- Flying Height ~3,048 m (10,000’) asl => x = 3,118 m; y = 2,081 m

f. Flight Conditions

- Low wind (below 5 knots)
- Sun angle between 25 and 35 degrees
- Preferably low tide

| | | |
|---|---|---|
| **Project Name =** | **DEP_0409** | |
| | | |
| Coordinate System = | MGA94 | |
| Datum = | GDA94 | |
| Zone = | 55 | |
| | | |
| Camera Type = | Digital | |
| Camera Brand = | Canon EOS 5D | |
| Lens Type = | NORMAL | |
| Focal Length (f) = | 35 | mm |
| Filter = | polarising | |
| Film = | na | |
| Negative/CCD Size X (long side) = | 35.8 | mm |
| Negative/CCD Size Y (short side) = | 23.9 | mm |
| **Run 1:** | | units |
| Photo Scale = | 43,543 | ratio |
| Approx. Flying Height = | 1,524.0 | m |
| = | 5,000.0 | ft. |
| Photo (Frame) Length (X) = | 1,559 | m |
| ground distance per 1° FOV | | |
| Forward Overlap (Endlap) = | 60.0 | % |
| = | 935 | m |
| Forward Advance = | 40 | % |
| Photo Centres (Base) = | 624 | m |
| Photo (Frame) Width (Y) = | 1,041 | m |
| | | |
| Sidelap = | 30 | % |
| = | 312.3 | m |
| Approx. Time tween Exposures = | 14.9 | secs |
| @ plane ground speed = | 150 | km/hr |
| Total Model Length = | 8,000 | m |
| Total Coverage Length = | 744 | m |
| No. of Photos = | 13.3 | actually 14 |
| | | |
| Image Size (X) | 4,368 | pixels |
| Image Size (Y) | 2,912 | pixels |
| pixel size (image)(X) | 8.20 | microns |
| pixel size (image)(Y) | 8.21 | microns |
| pixel size (ground)(X) | 0.357 | m |
| pixel size (ground)(Y) | 0.357 | m |

| | | |
|---|---|---|
| **Project Name =** | **DEP_0409** | |
| | | |
| Coordinate System = | MGA94 | |
| Datum = | GDA94 | |
| Zone = | 55 | |
| | | |
| Camera Type = | Digital | |
| Camera Brand = | Canon EOS 5D | |
| Lens Type = | NORMAL | |
| Focal Length (f) = | 35 | mm |
| Filter = | polarising | |
| Film = | na | |
| Negative/CCD Size X (long side) = | 35.8 | mm |
| Negative/CCD Size Y (short side) = | 23.9 | mm |
| **Run 2:** | | units |
| Photo Scale = | 87,086 | ratio |
| Approx. Flying Height = | 3,048.0 | m |
| = | 10,000.0 | ft. |
| Photo (Frame) Length (X) = | 3,118 | m |
| ground distance per 1° FOV | | |
| Forward Overlap (Endlap) = | 60.0 | % |
| = | 1,871 | m |
| Forward Advance = | 40 | % |
| Photo Centres (Base) = | 1,247 | m |
| Photo (Frame) Width (Y) = | 2,081 | m |
| | | |
| Sidelap = | 30 | % |
| = | 624.3 | m |
| Approx. Time tween Exposures = | 29.9 | secs |
| @ plane ground speed = | 150 | km/hr |
| Total Model Length = | 8,000 | m |
| Total Coverage Length = | 744 | m |
| No. of Photos = | 6.9 | actually 7 |
| Image Size (X) | 4,368 | pixels |
| Image Size (Y) | 2,912 | pixels |
| pixel size (image)(X) | 8.20 | microns |
| pixel size (image)(Y) | 8.21 | microns |
| pixel size (ground)(X) | 0.714 | m |
| pixel size (ground)(Y) | 0.715 | m |

## Appendix 3. Listing of archival aerial photography over the upper Derwent estuary

Please note that there are over 700 photo listed here, but this list does not include photos from 50's, early 60's and 70's

| T_PROJ_NO | AP_TITLE | FLY_DATE | AP_SCALE | AP_HEIGHT | FILM_NO | RUN_NO | NEG_NO | AP_LENS |
|---|---|---|---|---|---|---|---|---|
| | HOBART | 02-May-46 | 7920 | 5650 | 16 | 7 | 14225 | |
| | HOBART | 02-May-46 | 7920 | 5650 | 16 | 7 | 14226 | |
| | HOBART | 02-May-46 | 7920 | 5650 | 16 | 7 | 14227 | |
| | HOBART | 02-May-46 | 7920 | 5650 | 16 | 7 | 14228 | |
| | HOBART | 02-May-46 | 7920 | 5650 | 16 | 7 | 14229 | |
| | HOBART | 02-May-46 | 7920 | 5650 | 16 | 7 | 14230 | |
| | HOBART | 20-Apr-46 | 7920 | 5650 | 18 | 11 | 13123 | |
| | HOBART | 20-Apr-46 | 7920 | 5650 | 18 | 11 | 13124 | |
| | HOBART | 20-Apr-46 | 7920 | 5650 | 18 | 11 | 13125 | |
| | HOBART | 20-Apr-46 | 7920 | 5650 | 18 | 11 | 13126 | |
| | HOBART | 20-Apr-46 | 7920 | 5650 | 18 | 11 | 13127 | |
| | HOBART | 20-Apr-46 | 7920 | 5650 | 18 | 11 | 13128 | |
| | HOBART | 20-Apr-46 | 7920 | 5650 | 18 | 11 | 13129 | |
| | HOBART | 20-Apr-46 | 7920 | 5650 | 18 | 11 | 13130 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9730 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9731 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9732 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9733 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9734 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9735 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9736 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9737 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9738 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9739 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9740 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9741 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9742 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9743 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9744 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9745 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9746 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9747 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9748 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9749 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 1 | 9750 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 2 | 9800 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 2 | 9801 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 2 | 9802 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 2 | 9803 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 2 | 9804 | |
| | HOBART | 04-Mar-46 | 15840 | 12000 | 29 | 2 | 9805 | |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18447 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18448 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18449 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18450 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18451 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18452 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18453 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18454 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18455 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18456 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18457 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18458 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18459 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18460 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18461 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18462 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18463 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18464 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18465 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18466 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18467 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18468 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18469 |
| | BRIGHTON | 17-Feb-46 | 18180 | 12500 | 43 | 10 | 18470 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 7 | 15 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 7 | 16 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 7 | 17 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 7 | 18 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 7 | 19 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 7 | 20 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 7 | 21 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 6 | 97 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 6 | 98 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 6 | 99 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 5 | 148 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 5 | 149 |
| P1519 | Derwent - D'Entrecasteaux | 02-Mar-65 | 31680 | 13000 | 453 | 5 | 150 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 455 | 2 | 35 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 455 | 2 | 36 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 455 | 2 | 37 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 455 | 2 | 38 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 456 | 4 | 130 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 456 | 4 | 131 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 456 | 4 | 132 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 456 | 4 | 133 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 456 | 3 | 178 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 456 | 3 | 179 |
| P1519 | Derwent - D'Entrecasteaux | 21-Jan-66 | 31680 | 13000 | 456 | 3 | 180 |
| P1674 | FIRE ASSESSMENT | 18-Feb-67 | 15840 | 12000 | 488 | 24 | 28 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| P1674 | FIRE ASSESSMENT | 18-Feb-67 | 15840 | 12000 | 488 | 24 | 29 | |
| P1674 | FIRE ASSESSMENT | 18-Feb-67 | 15840 | 12000 | 488 | 24 | 30 | |
| P1674 | FIRE ASSESSMENT | 18-Feb-67 | 15840 | 12000 | 488 | 25 | 33 | |
| P1674 | FIRE ASSESSMENT | 18-Feb-67 | 15840 | 12000 | 488 | 25 | 34 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 3 | 94 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 3 | 95 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 3 | 96 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 3 | 97 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 3 | 98 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 3 | 99 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 3 | 100 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 3 | 101 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 3 | 102 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 3 | 103 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 2 | 112 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 2 | 113 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 2 | 114 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 509 | 2 | 115 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 1 | 31 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 1 | 32 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 1 | 33 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 4 | 134 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 4 | 135 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 4 | 136 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 4 | 137 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 4 | 138 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 4 | 139 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 4 | 140 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 4 | 141 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 4 | 142 | |
| P0012 | HOBART REVISION (1969) | 23-Jan-69 | 14400 | 12500 | 510 | 4 | 143 | |
| P0012 | HOBART REVISION (1969) | 24-Jan-69 | 14400 | 12500 | 510 | 5 | 202 | |
| P0012 | HOBART REVISION (1969) | 24-Jan-69 | 14400 | 12500 | 510 | 5 | 203 | |
| P0012 | HOBART REVISION (1969) | 24-Jan-69 | 14400 | 12500 | 510 | 5 | 204 | |
| P0012 | HOBART REVISION (1969) | 24-Jan-69 | 14400 | 12500 | 510 | 5 | 205 | |
| P0012 | HOBART REVISION (1969) | 24-Jan-69 | 14400 | 12500 | 510 | 5 | 206 | |
| M55NN | NEW NORFOLK | 7-JAN-84 | 5000 | 5100 | 973 | 1 | 209 | 305 |
| M55NN | NEW NORFOLK | 7-JAN-84 | 5000 | 5100 | 975 | 2 | 29 | 305 |
| M55NN | NEW NORFOLK | 7-JAN-84 | 5000 | 5100 | 975 | 2 | 30 | 305 |
| M385 | RICHMOND - GREEN PONDS | 13-JAN-84 | 15000 | 15000 | 976 | 93 | 219 | 305 |
| M385 | RICHMOND - GREEN PONDS | 13-JAN-84 | 15000 | 15000 | 976 | 93 | 220 | 305 |
| M385 | RICHMOND - GREEN PONDS | 13-JAN-84 | 15000 | 15000 | 976 | 93 | 221 | 305 |
| M385 | RICHMOND - GREEN PONDS | 13-JAN-84 | 15000 | 15000 | 976 | 93 | 222 | 305 |
| M385 | RICHMOND - GREEN PONDS | 13-JAN-84 | 15000 | 15000 | 976 | 93 | 223 | 305 |
| M385 | RICHMOND - GREEN PONDS | 13-JAN-84 | 15000 | 15000 | 977 | 92 | 203 | 305 |
| M385 | RICHMOND - GREEN PONDS | 13-JAN-84 | 15000 | 15000 | 977 | 92 | 204 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 2 | 11 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 2 | 12 | 305 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 3 | 19 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 3 | 20 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 3 | 21 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 3 | 22 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 3 | 23 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 3 | 24 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 4 | 54 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 4 | 55 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 4 | 56 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 4 | 57 | 305 |
| M379 | HOBART CENSUS | 5-FEB-84 | 20000 | 21000 | 983 | 4 | 61 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 222 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 223 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 224 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 225 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 226 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 227 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 228 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 229 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 230 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 231 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 232 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 233 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 234 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 235 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 236 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 237 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 238 | 305 |
| M55HO | HOBART AREA | 18-FEB-84 | 5000 | 5100 | 986 | 10N | 239 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 6 | 158 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 6 | 159 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 6 | 160 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 6 | 161 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 6 | 162 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 6 | 163 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 6 | 164 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 7 | 165 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 7 | 166 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 7 | 167 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 7 | 168 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 7 | 169 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 7 | 170 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 7 | 171 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 7 | 172 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 7 | 173 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 8 | 221 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 8 | 222 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 8 | 223 | 305 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 8 | 224 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 8 | 225 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 8 | 226 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 8 | 227 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 8 | 228 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 230 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 231 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 232 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 233 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 234 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 235 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 236 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 237 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 238 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 239 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 240 | 305 |
| M55HO | HOBART AREA | 11-MAR-84 | 5000 | 5100 | 995 | 9 | 241 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 61 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 62 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 63 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 64 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 65 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 66 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 67 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 68 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 69 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 70 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 71 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 72 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 73 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 74 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 75 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 76 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 77 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 11 | 78 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 158 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 159 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 160 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 161 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 162 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 163 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 164 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 165 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 166 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 167 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 168 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 169 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 170 | 305 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 171 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 172 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 173 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 174 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 175 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 12 | 176 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 177 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 178 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 179 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 180 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 181 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 182 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 183 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 184 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 185 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 186 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 187 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 188 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 189 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 190 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 191 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 998 | 13A | 192 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 14N | 36 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 14N | 37 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 14N | 38 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 14N | 39 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 14N | 40 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 14N | 41 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 14N | 42 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 14N | 43 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 14N | 44 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 15 | 55 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 15 | 56 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 15 | 57 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 15 | 58 | 305 |
| M55HO | HOBART AREA | 2-APR-84 | 5000 | 5100 | 999 | 15 | 59 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 43 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 44 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 45 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 46 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 47 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 48 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 49 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 50 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 51 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 52 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 53 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 54 | 305 |

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|---|---|---|---|---|---|---|---|---|
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 55 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 56 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 57 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 58 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 59 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 60 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 61 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 11 | 62 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 63 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 64 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 65 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 66 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 67 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 68 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 69 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 70 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 71 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 72 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 73 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 74 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 75 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 76 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 77 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 78 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 79 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 80 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 81 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 10N | 82 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9S | 143 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9S | 144 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 145 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 146 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 147 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 148 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 149 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 150 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 151 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 152 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 153 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 154 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 155 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 156 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 157 | 305 |
| M542 | HOBART AREA | 4-NOV-85 | 5000 | 5100 | 1043 | 9N | 158 | 305 |
| M548 | SOUTH EAST | 13-NOV-85 | 42000 | 22500 | 1044 | 35 | 70 | 153 |
| M548 | SOUTH EAST | 13-NOV-85 | 42000 | 22500 | 1044 | 35 | 71 | 153 |
| M548 | SOUTH EAST | 13-NOV-85 | 42000 | 22500 | 1044 | 35 | 72 | 153 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 4 | 109 | 305 |

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|---|---|---|---|---|---|---|---|---|
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 4 | 110 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 4 | 111 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 4 | 112 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 4 | 113 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 3N | 128 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 3N | 129 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 3N | 130 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 3N | 131 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 3N | 132 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 3N | 133 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 3N | 134 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 2 | 174 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 2 | 175 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 2 | 176 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 2 | 177 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 2 | 178 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 2 | 179 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 2 | 180 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 1 | 192 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 1 | 193 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 1 | 194 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 1 | 195 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 1 | 196 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 1 | 197 | 305 |
| M628 | HOBART ATLAS REVISION | 26-FEB-86 | 12500 | 12700 | 1059 | 1 | 198 | 305 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 7 | 133 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 7 | 134 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 7 | 135 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 7 | 136 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 7 | 137 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 7 | 138 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 7 | 139 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 7 | 140 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 141 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 142 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 143 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 144 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 145 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 146 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 147 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 148 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 149 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 150 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 151 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 152 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 153 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 154 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 155 | 153 |

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|---|---|---|---|---|---|---|---|---|
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 156 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 157 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 6 | 158 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 187 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 188 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 189 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 190 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 191 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 192 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 193 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 194 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 195 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 196 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 197 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 198 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 199 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 200 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 201 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 202 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 203 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 204 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 205 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 206 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 207 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 208 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 209 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 210 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 8 | 211 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 212 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 213 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 214 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 215 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 216 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 217 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 218 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 219 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 220 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 221 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 222 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 223 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 224 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 225 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 226 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1082 | 9 | 227 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1083 | 13 | 1 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1083 | 13 | 2 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1083 | 13 | 3 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1083 | 13 | 4 | 153 |

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|---|---|---|---|---|---|---|---|---|
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1083 | 13 | 5 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1083 | 13 | 6 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1083 | 13 | 7 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1083 | 13 | 8 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1083 | 11 | 23 | 153 |
| M688 | BOWEN BRIDGE DYSART | 02-FEB-87 | 8000 | 4530 | 1083 | 4 | 45 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 1 | 167 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 1 | 168 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 1 | 169 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 1 | 170 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 1 | 171 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 1 | 172 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 1 | 173 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 2 | 178 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 2 | 179 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 2 | 180 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 2 | 181 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 2 | 182 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 2 | 183 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 2 | 184 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 2 | 185 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 2 | 186 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 3N | 195 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 3N | 196 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 3N | 197 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 3N | 198 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 3N | 199 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 3N | 200 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 3N | 201 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1098 | 3N | 202 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1105 | 4 | 8 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1105 | 4 | 9 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1105 | 4 | 10 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1105 | 4 | 11 | 153 |
| M628 | HOBART AREA 1988 | 04-FEB-88 | 12500 | 6450 | 1105 | 4 | 12 | 153 |
| M797 | MEEHAN RANGE | 23-NOV-88 | 23000 | 12000 | 1116 | 1 | 6 | 153 |
| M797 | MEEHAN RANGE | 23-NOV-88 | 23000 | 12000 | 1116 | 1 | 7 | 153 |
| M797 | MEEHAN RANGE | 23-NOV-88 | 23000 | 12000 | 1116 | 1 | 8 | 153 |
| M797 | MEEHAN RANGE | 23-NOV-88 | 23000 | 12000 | 1116 | 1 | 9 | 153 |
| M797 | MEEHAN RANGE | 23-NOV-88 | 23000 | 12000 | 1116 | 1 | 10 | 153 |
| M797 | MEEHAN RANGE | 23-NOV-88 | 23000 | 12000 | 1116 | 1 | 11 | 153 |
| M797 | MEEHAN RANGE | 23-NOV-88 | 23000 | 12000 | 1116 | 1 | 12 | 153 |
| M797 | MEEHAN RANGE | 23-NOV-88 | 23000 | 12000 | 1116 | 2 | 17 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 1N | 111 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 1N | 112 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 1N | 113 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 1N | 114 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 1N | 115 | 153 |

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|---|---|---|---|---|---|---|---|---|
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 1N | 116 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 1N | 117 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 1N | 118 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 2 | 160 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 2 | 161 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 2 | 162 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 2 | 163 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 2 | 164 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 2 | 165 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 2 | 166 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 3 | 179 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 3 | 180 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 3 | 181 | 153 |
| M802 | HOBART AREA | 22-DEC-88 | 12500 | 6500 | 1120 | 3 | 182 | 153 |
| M55NN | NEW NORFOLK | 1-MAR-89 | 12500 | 6300 | 1137 | 1 | 48 | 153 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 1 | 106 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 1 | 107 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 1 | 108 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 1 | 109 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 1 | 110 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 1 | 111 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 1 | 112 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 1 | 113 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 2 | 124 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 2 | 125 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 2 | 126 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 2 | 127 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 2 | 128 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 2 | 129 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 2 | 130 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 3 | 187 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 3 | 188 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 3 | 189 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 3 | 190 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 4 | 202 | 305 |
| M864 | HOBART AREA | 07-DEC-89 | 12500 | 12800 | 1142 | 4 | 203 | 305 |
| M85CM | CLAREMONT GOLF COURSE | 17-DEC-89 | 7000 | 7000 | 1144 | 0 | 132 | 305 |
| M85CM | CLAREMONT GOLF COURSE | 17-DEC-89 | 7000 | 7000 | 1144 | 0 | 133 | 305 |
| M55CV | COLLINSVALE | 7-DEC-89 | 12500 | 13250 | 1145 | 4 | 123 | 305 |
| M55CV | COLLINSVALE | 7-DEC-89 | 12500 | 13250 | 1145 | 4 | 124 | 305 |
| M55CV | COLLINSVALE | 7-DEC-89 | 12500 | 13250 | 1145 | 4 | 125 | 305 |
| M875 | HUON - KINGBOROUGH OPM | 22-JAN-90 | 24000 | 13000 | 1147 | 10 | 228 | 153 |
| M880 | PROSSER NUGENT | 25-FEB-90 | 42000 | 22500 | 1154 | 35 | 38 | 153 |
| M897 | DERWENT WATER SUPPLY | 16-MAR-90 | 7500 | 4000 | 1154 | 2 | 172 | 153 |
| M897 | DERWENT WATER SUPPLY | 16-MAR-90 | 7500 | 4000 | 1154 | 3 | 184 | 153 |
| M897 | DERWENT WATER SUPPLY | 16-MAR-90 | 7500 | 4400 | 1154 | 1 | 196 | 153 |
| M897 | DERWENT WATER SUPPLY | 16-MAR-90 | 7500 | 4400 | 1154 | 1 | 197 | 153 |
| M922 | NEW NORFOLK - | 2-JAN-91 | 26000 | 14000 | 1162 | 3 | 84 | 153 |

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|---|---|---|---|---|---|---|---|---|
| | COLLINSVALE | | | | | | | |
| M922 | NEW NORFOLK - COLLINSVALE | 2-JAN-91 | 26000 | 14000 | 1162 | 3 | 85 | 153 |
| M922 | NEW NORFOLK - COLLINSVALE | 2-JAN-91 | 26000 | 14000 | 1162 | 3 | 86 | 153 |
| M922 | NEW NORFOLK - COLLINSVALE | 2-JAN-91 | 26000 | 14000 | 1162 | 3 | 87 | 153 |
| M922 | NEW NORFOLK - COLLINSVALE | 2-JAN-91 | 26000 | 14000 | 1162 | 3 | 88 | 153 |
| M911CL | CLAREMONT | 2-FEB-91 | 6000 | 6000 | 1166 | 0 | 52 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 13500 | 1183 | 1 | 166 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 13500 | 1183 | 1 | 167 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 13500 | 1183 | 1 | 168 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 13500 | 1183 | 1 | 169 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 13500 | 1183 | 1 | 170 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 13500 | 1183 | 1 | 171 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 12800 | 1183 | 2 | 177 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 12800 | 1183 | 2 | 178 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 12800 | 1183 | 2 | 179 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 12800 | 1183 | 2 | 180 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 12800 | 1183 | 2 | 181 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 12800 | 1183 | 2 | 182 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 12800 | 1183 | 2 | 183 | 305 |
| M985 | HOBART | 16-FEB-92 | 12500 | 12800 | 1183 | 2 | 184 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 3N | 14 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 3N | 15 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 3N | 16 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 3N | 17 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 3N | 18 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 3N | 19 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 4 | 29 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 4 | 30 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 4 | 31 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 4 | 32 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 4 | 33 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 5 | 91 | 305 |
| M985 | HOBART | 16-2-92 | 12500 | 12800 | 1184 | 5 | 92 | 305 |
| M990NN | NEW NORFOLK | 19-FEB-92 | 12500 | 12550 | 1186 | 2 | 23 | 305 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 101 | 153 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 102 | 153 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 103 | 153 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 104 | 153 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 105 | 153 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 106 | 153 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 107 | 153 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 108 | 153 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 109 | 153 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 110 | 153 |
| A046 | Gagebrook OPM 93-94 | 16-NOV-93 | 24000 | 12000 | 1203 | 1 | 111 | 153 |
| M797 | Meehan Range OPM 93-94 | 12-FEB-94 | 24000 | 12500 | 1217 | 1 | 132 | 153 |
| M797 | Meehan Range OPM 93-94 | 12-FEB-94 | 24000 | 12500 | 1217 | 1 | 133 | 153 |

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|---|---|---|---|---|---|---|---|---|
| M797 | Meehan Range OPM 93-94 | 12-FEB-94 | 24000 | 12500 | 1217 | 1 | 134 | 153 |
| M797 | Meehan Range OPM 93-94 | 12-FEB-94 | 24000 | 12500 | 1217 | 1 | 135 | 153 |
| M797 | Meehan Range OPM 93-94 | 12-FEB-94 | 24000 | 12500 | 1217 | 1 | 136 | 153 |
| M797 | Meehan Range OPM 93-94 | 12-FEB-94 | 24000 | 12500 | 1217 | 1 | 137 | 153 |
| M797 | Meehan Range OPM 93-94 | 12-FEB-94 | 24000 | 12500 | 1217 | 1 | 138 | 153 |
| M55NN | NEW NORFOLK | 20-2-95 | 12500 | 12600 | 1231 | 2 | 200 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1233 | 1 | 121 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1233 | 1 | 122 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1233 | 1 | 123 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1233 | 1 | 124 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1233 | 1 | 125 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1233 | 1 | 126 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1233 | 1 | 127 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1233 | 1 | 128 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1233 | 2S | 195 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1233 | 2S | 196 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1234 | 2N | 7 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1234 | 2N | 8 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1234 | 2N | 9 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1234 | 2N | 10 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1234 | 2N | 11 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1234 | 2N | 12 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1234 | 3 | 19 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1234 | 3 | 20 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1234 | 3 | 21 | 305 |
| A083 | HOBART AREA | 3-3-95 | 12500 | 12800 | 1234 | 3 | 22 | 305 |
| A083 | HOBART AREA | 11-3-95 | 12500 | 12800 | 1234 | 4 | 81 | 305 |
| A106HD | HUON - DERWENT | 19-JAN-97 | 24000 | 12500 | 1260 | 10N | 194 | 153 |
| A106HD | HUON - DERWENT | 19-JAN-97 | 24000 | 12500 | 1260 | 10N | 195 | 153 |
| A106HD | HUON - DERWENT | 19-JAN-97 | 24000 | 12500 | 1260 | 10N | 196 | 153 |
| A106HD | HUON - DERWENT | 19-JAN-97 | 24000 | 13000 | 1260 | 9N | 216 | 153 |
| A106HD | HUON - DERWENT | 19-JAN-97 | 24000 | 13000 | 1260 | 9N | 217 | 153 |
| A106HD | HUON - DERWENT | 19-JAN-97 | 24000 | 13000 | 1260 | 9N | 218 | 153 |
| A106HD | HUON - DERWENT | 19-JAN-97 | 24000 | 13000 | 1260 | 9N | 219 | 153 |
| A106HD | HUON - DERWENT | 19-JAN-97 | 24000 | 13000 | 1260 | 8N | 222 | 153 |
| A106HD | HUON - DERWENT | 19-JAN-97 | 24000 | 13000 | 1260 | 8N | 223 | 153 |
| A106HD | HUON - DERWENT | 19-JAN-97 | 24000 | 13000 | 1260 | 8N | 224 | 153 |
| A110 | SOUTHERN REVISION | 13-JAN-97 | 42000 | 22500 | 1262 | 35 | 118 | 153 |
| A110 | SOUTHERN REVISION | 13-JAN-97 | 42000 | 22500 | 1262 | 35 | 119 | 153 |
| A110 | SOUTHERN REVISION | 13-JAN-97 | 42000 | 22500 | 1262 | 35 | 120 | 153 |
| M990MB | MILVALE-BOYER RD | 15-FEB-97 | 5000 | 5000 | 1269 | 0 | 147 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1269 | 4 | 177 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1269 | 4 | 178 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 3 | 32 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 3 | 33 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 3 | 34 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 3 | 35 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 2 | 53 | 305 |

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|---|---|---|---|---|---|---|---|---|
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 2 | 54 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 2 | 55 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 2 | 56 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 2 | 57 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 2 | 58 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 2 | 59 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 1 | 141 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 1 | 142 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 1 | 143 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 1 | 144 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 1 | 145 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 1 | 146 | 305 |
| A083 | HOBART ATLAS REVISION | 15-FEB-97 | 12500 | 12800 | 1271 | 1 | 147 | 305 |
| A106H | HUON - DERWENT ROAD UPDATE | 09-JAN-98 | 24000 | 14000 | 1280 | 7N | 103 | 153 |
| A106H | HUON - DERWENT ROAD UPDATE | 09-JAN-98 | 24000 | 14000 | 1280 | 7N | 104 | 153 |
| A106H | HUON - DERWENT ROAD UPDATE | 12-JAN-98 | 24000 | 14000 | 1285 | 9CN | 93 | 153 |
| A106H | HUON - DERWENT ROAD UPDATE | 12-JAN-98 | 24000 | 14000 | 1285 | 9CN | 94 | 153 |
| A106H | HUON - DERWENT ROAD UPDATE | 12-JAN-98 | 24000 | 14000 | 1285 | 9CN | 95 | 153 |
| A131 | DERWENT REVISION | 14-DEC-99 | 42000 | 22100 | 1320 | 35 | 155 | 153 |
| A131 | DERWENT REVISION | 14-DEC-99 | 42000 | 22100 | 1320 | 35 | 156 | 153 |
| A131 | DERWENT REVISION | 14-DEC-99 | 42000 | 22100 | 1320 | 35 | 157 | 153 |
| A131 | DERWENT REVISION | 14-DEC-99 | 42000 | 22100 | 1320 | 35 | 158 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 03-JAN-01 | 24000 | 13000 | 1341 | 8N | 63 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 03-JAN-01 | 24000 | 13000 | 1341 | 8N | 64 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 03-JAN-01 | 24000 | 13000 | 1341 | 8N | 65 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 03-JAN-01 | 24000 | 13000 | 1341 | 9N | 67 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 03-JAN-01 | 24000 | 13000 | 1341 | 9N | 68 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 03-JAN-01 | 24000 | 13000 | 1341 | 9N | 69 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 21-JAN-01 | 24000 | 12600 | 1343 | 10N | 208 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 21-JAN-01 | 24000 | 12600 | 1343 | 10N | 209 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 21-JAN-01 | 24000 | 12600 | 1343 | 10N | 210 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 21-JAN-01 | 24000 | 14000 | 1343 | 9CN | 218 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 21-JAN-01 | 24000 | 14000 | 1343 | 9CN | 219 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 21-JAN-01 | 24000 | 14000 | 1343 | 9CN | 220 | 153 |
| A135HD | HUON - DERWENT : URBAN OPM | 21-JAN-01 | 24000 | 14000 | 1344 | 7CN | 37 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5800 | 1361 | 1 | 12 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5800 | 1361 | 1 | 13 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5800 | 1361 | 1 | 14 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5800 | 1361 | 1 | 15 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5800 | 1361 | 1 | 16 | 153 |

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|---|---|---|---|---|---|---|---|---|
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5800 | 1361 | 1 | 17 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5800 | 1361 | 1 | 18 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5800 | 1361 | 1 | 19 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5800 | 1361 | 1 | 20 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 26 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 27 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 28 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 29 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 30 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 31 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 32 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 33 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 34 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 35 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 2 | 36 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 3N | 70 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 3N | 71 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 3N | 72 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 3N | 73 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 3N | 74 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 3N | 75 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 3N | 76 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 3N | 77 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 3N | 78 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 4N | 96 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 4N | 97 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 4N | 98 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 4N | 99 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 4N | 100 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 4N | 101 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 4N | 102 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 5 | 169 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 5 | 170 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 5 | 171 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 5 | 172 | 153 |
| A140HB | HOBART AREA | 23-NOV-02 | 10000 | 5400 | 1361 | 5 | 173 | 153 |
| A110 | SOUTHERN REVISION 2002-03 | 02-FEB-03 | 42000 | 22500 | 1368 | 35 | 117 | 153 |
| A110 | SOUTHERN REVISION 2002-03 | 02-FEB-03 | 42000 | 22500 | 1368 | 35 | 118 | 153 |
| A110 | SOUTHERN REVISION 2002-03 | 02-FEB-03 | 42000 | 22500 | 1368 | 35 | 119 | 153 |
| A110 | SOUTHERN REVISION 2002-03 | 02-FEB-03 | 42000 | 22500 | 1368 | 35 | 120 | 153 |
| A136F174 | FORESTRY AREA : F174 | 08-FEB-03 | 15000 | 8400 | 1369 | 1 | 180 | 153 |
| A136F173 | FORESTRY AREA : F173 | 08-FEB-03 | 15000 | 8400 | 1369 | 1 | 181 | 153 |
| A136F173 | FORESTRY AREA : F173 | 08-FEB-03 | 15000 | 8400 | 1369 | 1 | 182 | 153 |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 13000 | 1382 | 9N | 118 | 153 |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 13000 | 1382 | 9N | 119 | 153 |
| A135HD | HUON-DERWENT : URBAN | 28-MAR-04 | 24000 | 13000 | 1382 | 9N | 120 | 153 |

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|---|---|---|---|---|---|---|---|---|
| | OPM | | | | | | | |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 13000 | 1382 | 8N | 122 | 153 |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 13000 | 1382 | 8N | 123 | 153 |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 13000 | 1382 | 8N | 124 | 153 |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 12600 | 1382 | 10N | 134 | 153 |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 12600 | 1382 | 10N | 135 | 153 |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 12600 | 1382 | 10N | 136 | 153 |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 14000 | 1382 | 9CN | 147 | 153 |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 14000 | 1382 | 9CN | 148 | 153 |
| A135HD | HUON-DERWENT : URBAN OPM | 28-MAR-04 | 24000 | 14000 | 1382 | 9CN | 149 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5800 | 1413 | 1 | 233 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5800 | 1413 | 1 | 234 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5800 | 1413 | 1 | 235 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5800 | 1413 | 1 | 236 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5800 | 1413 | 1 | 237 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5800 | 1413 | 1 | 238 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5800 | 1413 | 1 | 239 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5800 | 1413 | 1 | 240 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5800 | 1413 | 1 | 241 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 24 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 25 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 26 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 27 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 28 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 29 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 30 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 31 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 32 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 33 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 2 | 34 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 3N | 49 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 3N | 50 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 3N | 51 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 3N | 52 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 3N | 53 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 3N | 54 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 3N | 55 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 3N | 56 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 3N | 57 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 4N | 77 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 4N | 78 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 4N | 79 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 4N | 80 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 4N | 81 | 153 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 4N | 82 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 4N | 83 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 5 | 151 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 5 | 152 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 5 | 153 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 5 | 154 | 153 |
| A140HB | HOBART AREA | 09-DEC-06 | 10000 | 5400 | 1417 | 5 | 155 | 153 |
| A110 | SOUTHERN REVISION 2007 | 13-FEB-07 | 42000 | 22500 | 1422 | 35 | 21 | 153 |
| A110 | SOUTHERN REVISION 2007 | 13-FEB-07 | 42000 | 22500 | 1422 | 35 | 22 | 153 |
| A110 | SOUTHERN REVISION 2007 | 13-FEB-07 | 42000 | 22500 | 1422 | 35 | 23 | 153 |
| A110 | SOUTHERN REVISION 2007 | 13-FEB-07 | 42000 | 22500 | 1422 | 35 | 24 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 13000 | 1430 | 8N | 136 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 13000 | 1430 | 8N | 137 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 13000 | 1430 | 8N | 138 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 14000 | 1430 | 7N | 193 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 12600 | 1431 | 10N | 175 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 12600 | 1431 | 10N | 176 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 12600 | 1431 | 10N | 177 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 14000 | 1431 | 9CN | 197 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 14000 | 1431 | 9CN | 198 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 14000 | 1431 | 9CN | 199 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 13000 | 1431 | 9N | 207 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 13000 | 1431 | 9N | 208 | 153 |
| A135HD | HUON - DERWENT: URBAN ORTHO | 18-FEB-08 | 24000 | 13000 | 1431 | 9N | 209 | 153 |
| | | 08-Nov-09 | 42000 | 22600 | 1440 | | 162 | |
| | | 08-Nov-09 | 42000 | 22600 | 1440 | | 163 | |
| | | 08-Nov-09 | 42000 | 22600 | 1440 | | 164 | |