Seaspray Flood Study – Assess and Treat Risk (R04)

March 2016

Australian Government

VICTORIA State Government | Environment, Land, Water and Planning

WELLINGTON SHIRE COUNCIL The Heart of Gippsland

West Gippsland Catchment Management Authority

DOCUMENT STATUS

Version	Doc type	Reviewed by	Approved by	Distributed to	Date issued
v01	Draft				03/03/2016
v02	Final				06/06/2016

PROJECT DETAILS

Project Name	3569-03_Seaspray Flood Study
Client	West Gippsland Catchment Management Authority
Client Project Manager	
Water Technology Project Manager	
Report Authors	
Job Number	3569-03
Report Number	R04
Document Name	3569-03_R04v01b.docx

Cover Photo: Seaspray Flooding 1993.

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1. INTRODUCTION

Following the flood events affecting Seaspray during September 1993, October 1995 and June 2012, Water Technology was commissioned by the West Gippsland CMA to undertake the Seaspray Flood Study. This study included detailed hydrologic and hydraulic modelling of the Merriman Creek estuary, including impacts from ocean conditions, water levels in Lake Reeve and stormwater run-off from Seaspray. A series of flood maps have been prepared for the town of Seaspray, including recommendations for flood mitigation works and review of flood warning and planning controls.

This report details the flood risk and assessment outcomes of the hydraulic analysis undertaken for the project, and should be read in conjunction with the previous reports:

- Data Review Report (R01)
- Hydrological Report (R02)
- Hydraulic Report (R03)

2. STUDY AREA

Seaspray is a coastal town with 320 permanent residents which rises to more than 1,000 during summer. The township lies at the western end of the Ninety Mile Beach west of the Gippsland Lakes and approximately 200 km east of Melbourne. As detailed in the Urban Design Framework developed for the township by Wellington Shire Council (Wellington Shire Council, 2007), Seaspray is an important access point to 90 Mile Beach, and the areas of small lot subdivision that extend easterly for 28 km to Golden Beach and Paradise Beach.

The town is located on the estuarine floodplain of the Merriman Creek catchment. Merriman creek flows along the western boundary of Seaspray before it passes through the 90 Mile Beach coastal dune system and enters Bass Strait. As part of the flood mitigation scheme completed in 1987, an engineered floodway running through the middle of the town, has the ability to distribute water from the Merriman Creek estuary to Lake Reeve in the east.

In this study area, flooding can occur as a result of a range of potential mechanisms, including;

- Overbank flows from Merriman Creek,
- Coastal inundation due to elevated ocean levels,
- Flooding from the Gippsland Lakes via Lake Reeve,
- Localised stormwater flooding.

Each of these flooding mechanisms and their interactions have been investigated as part of the hydraulic assessment and detailed within the Hydraulics Report (R03).

Figure 2-1 Seaspray Flood Study Model Area

3. FLOOD INTELLIGENCE

3.1 Overview

Hydraulic model results from this study has allowed for further flood intelligence to be added to the existing information.

Flood mitigation measures for the township of Seaspray were implemented in 1987 following the 1978 flood event and subsequent flood study. The works included construction of the floodway to Lake Reeve with a regulator structure at Merriman Creek, and the multiple earthen levees along the eastern edge of Merriman Creek and either side of the floodway. These measures have proven successful in limiting flood damage within Seaspray in subsequent flood events in 1995 and 2012. However, during the 1993 flood event flooding did occur in Seaspray. This occurred as a result of flow diversions associated with an unauthorised levee being constructed across the flow path down Blind Creek and limited culvert capacity under Seaspray Road. Modelling of the same event with the levee removed and culverts upgraded indicated that no floodwaters would have entered the township and the levees would not have been overtopped.

Despite the relative success of existing mitigation measures during recent flood events, concern still exists for future flooding of Seaspray given the very low topographical relief of the town. Also, there are currently no flood warning gauge levels for Seaspray despite the presence of stream flow gauges at Prospect Rd and further upstream at Stradbroke West. Recent historic flood events and design flood levels are listed in Table 3-1 with respect to the Prospect Road Gauge.

The gauge at Prospect Road (227240A) has now been relocated to the upstream 227272A Merriman Creek at Gippsland Water Offtake location. The monitoring of level and flow data will in future be based on the new monitoring location. However, it is still intended for both gauges along with high flow measuring to remain in both locations, so that a flow and level relationship can be developed between the two sites. At this stage there have been no significant high flows recorded at the new site to verify the top end of the rating table.

All gauge heights and flows presented in this report are relative to the 227240A gauge location. A period of data collection of high flow events will be required to develop a rating curve relationship between the 227240A and 227272A gauge locations. After a reliable relationship is established, all gauge height references will need to be updated to the new 227272A gauge.

Table 3-1 Prospect Road Stream Flow Gauge Heights and Levels

Flood Event (% AEP)	Gauge Height (m)	Water Surface Level (m AHD)
0.5	NA*	NA*
1	6.36	8.90
1995	5.64	8.18
2	5.57	8.11
1993	5.53	8.07
5	4.82	7.36
10	3.78	6.32
2012	3.18	5.72

* Beyond Gauge Rating Curve

Table 3-2 describes the flood consequences associated with different design events and the associated gauge level at Prospect Road. The table has been set out to be read from the top down to include all flood consequences from the frequent to infrequent flood events.

When using Table 3-2 ***to identify particular consequences for a given flood event, the reader should read all rows of consequences above the selected magnitude design event.***

Table 3-2 Design Flood Events and Associated Flood Consequences

Design Flood Event (% AEP)	Gauge Height at Prospect Road (m)	Flood Consequences
10	3.78	River flooding confined to banks of Merriman Creek and Blind creek and the floodway toward Lake Reeve. There is some flow across the floodplains west of Merriman Creek at the estuary. There is some pooling of water throughout the town due to localised stormwater runoff with minor impacts on houses along Foreshore Rd and Rowley St. Depths of around 200mm on parts of Foreshore Rd and Futchers St. **Total Properties Flooded = 56** **Properties Flooded above floor level = 0**
5	4.82	River flooding confined to banks of Merriman Creek and Blind creek and the floodway toward Lake Reeve. Some flow breakout to the north of the floodway, east of the town, into undeveloped farmland. Pooling of stormwater throughout Seaspray. Depths of around 200mm on Foreshore Rd and parts of Futchers St and Centre Rd. Around 25 houses are within the flood extent. Properties along Rowley St begin to become inundated. **Total Properties Flooded = 57** **Properties Flooded above floor level = 0**
2	5.57	River flooding is mostly confined to banks of Merriman Creek and Blind Creek with some flow breaking the banks but remaining close to the main channels. Larger breakouts occurring to the east of the town, to the north of the floodway onto low lying farmland. Localised rainfall causing stormwater flooding within town. Around 45 houses within the flood extent. Properties along Shoreline Dr and Catton St begin to become impacted. Deeper flooding along Foreshore Rd, Futchers St and Centre Rd. **Total Properties Flooded = 58** **Properties Flooded above floor level = 0**
1	6.36	River flows overtopping some banks of Merriman Creek and Blind Creek adjacent to Griffioens Levee. Breakouts from the floodway also occur, leading to flow over Government Road Levee from the floodway. Deep flows to the east of Seaspray flowing towards Lake Reeve. Overland flow to the west of the Merriman Creek towards the estuary. Localised pooling of stormwater runoff over a number of properties. Around 195 houses within the flood extent, many between Main Rd and Catton St. Inundation of a large number of roads, with deep water on Centre Rd, Catton St and Hansen St.

Design Flood Event (% AEP)	Gauge Height at Prospect Road (m)	Flood Consequences
		Total Properties Flooded = 177 **Properties Flooded above floor level = 37**
0.5	NA*	Breakout of flows in Merriman Creek north east of Buckleys Rd. Breakouts from Blind Creek and Merriman Creek adjacent to Griffioens Levee. Breakouts to the west of Merriman Creek moving westward. Seaspray Rd inundation, north of the town, resulting in potential isolation of the community. Shoreline Drive inundated between Seaspray and The Honeysuckles, causing potential isolation of the Honeysuckles. All houses within Seaspray township are within the flood extent except for several along Seaspray Rd, north of Tip Rd, and the south of Bearups St between Lyons St and Bock St. **Total Properties Flooded = 322** **Properties Flooded above floor level = 180**

* Beyond Gauge Rating Curve

3.2 Flood Risk

Flood risk is the product of the consequence and the frequency of a flood event occurring. To assess the flood risk within Seaspray, the hydraulic modelling outputs (depth and velocity) can be used to identify both the frequency of flood impacts (in terms of annual exceedance probability) and the consequence of the magnitude of the flood impacts. The method used to delineate high flood hazard is broadly based on the new Australian Rainfall and Runoff Project 10 'Appropriate Safety Criteria for People'. Criterion for delineating the flood overlay considers both vehicle and people safety, and are as follows:

- Depth > 0.3 m
- Velocity > 1.5 m/s
- Depth x velocity > 0.3 m^2/s.

If any of the above criteria is exceeded, there area is considered to be High Hazard. Low Hazard areas are locations within the flood extent, but do not exceed any of the above criteria. It is understood that the WGCMA favours this method as the board has approved development guidelines which adopt a depth of 0.30 m as the cut off for safety. The maximum flood hazard for the 1% AEP flood event is shown in Figure 3-1.

When considering the emergency response requirements for Seaspray during a flood event, it is important to consider the areas that are flooded first within the township and not only areas of high consequence (or high hazard). Areas first flooded are often areas that have a higher likelihood of flooding occurring and the flooding will occur at lower flow rates.

Areas that are considered High Hazard in more frequent events have a much higher flood risk. Figure 3-2 identifies areas of High Hazard in the more frequent 5% AEP flood event. High Hazard areas in the 5% AEP include Centre Road between Catton Street and Newton Street, and the intersection of Foreshore Road with Futcher Road. Both areas are impacted by localised stormwater runoff in relatively frequent flood events. Centre Road is of particular high Flood Risk, as it and Futcher Street are the only two access routes across the floodway to the southern region of Seaspray.

High Hazard areas within the 1% AEP flood extent may have a lower flood risk than High Hazard areas within the 5% AEP flood extent, due to the relevant flood mechanism. The 1% AEP flood High

Hazard area is largely due to the overbank breakout flows from Merriman Creek, which is much less likely to occur than stormwater flooding from localised rainfall events with a smaller AEP.

Figure 3-1 High and Low Hazard Areas in the 1% AEP flood event

Figure 3-2 High and Low Hazard Areas in the 5% AEP flood event

Even though High Hazard areas outside of the designated waterways are minimal for the 5% AEP flood event, it is also important to consider Low Hazard areas which are inundated frequently in smaller AEP events and the associated risks of regular nuisance flooding.

3.3 Flood Warning

3.3.1 Flood Event Timing

Two streamflow gauges located upstream of the township (Prospect Road and Stradbroke West) provide valuable information on the approaching streamflow towards Seaspray. This information can be used to provide a warning to an approaching flood to the Seaspray township. The time between peak flows at the two gauges can provide a good indication of the travel time and the available flood warning time, this is outlined in Table 3-3. However, the time between peak flows at the Stradbroke West gauge and Prospect Road gauge is highly variable and can range from 4 - 26 hours depending on the flood magnitude. The 1993 and 1995 flood events were significantly larger than the 2012 event and both have a flood peak travel time less than 10 hours. It appears that the larger the flood event the shorter the travel time.

While Table 3-3 shows the time between peak flows at the streamflow gauges, flood impacts in Seaspray can occur well before the flood peak arrives at the Prospect Road gauge. Localised rainfall can lead to stormwater flooding within Seaspray independently of any catchment flooding in Merriman Creek. High Risk areas, including Centre Road between Catton Street and Newton Street can be inundated from local rainfall, well before the flood peak from the catchment reaches Seaspray. The source of flooding is important to consider for emergency response procedures such as road closures, sandbagging and if required, evacuation.

Table 3-3 Historical Travel Time between Flood Peaks (based on gauge flows)

Historical Event	Time from Peak at Stradbroke West to Peak at Prospect Road
1993	~ 4 Hours
1995	~ 9 Hours
2012	~ 26 Hours

While the streamflow gauges at Stradbroke West and Prospect Road can provide up to 4 hours of warning time of an approaching flood, analysing the rainfall falling throughout the catchment can also provide a rough estimate of the expected flood magnitude. Rainfall totals also provide longer warning time in the range of 24-36 hours once heavy rain has started falling in the catchment. Antecedent conditions throughout the catchment will play a major role in how much of the rainfall fallen in the catchment is converted to runoff. Historical rainfall totals and flood events along with design rainfall totals and design flood magnitudes are shown in Table 3-4. These tables show the large difference between the rainfall totals in the upper and lower catchments that have been recorded in historical flood events.

Across the catchment, the rainfall totals change considerably from the lower area around Seaspray itself having far lower rainfall totals compared to the upper catchment totals around Mt Tassie. Seaspray is effectively in the rainfall shadow of the Strzelecki Ranges. It is useful to note that while using the rainfall totals to estimate a flood event magnitude, there are a number of factors that should be considered including where the rainfall fell within the catchment and the antecedent conditions of the catchment.

Table 3-4 Merriman Creek catchment rainfall and Design Flood Magnitude

Flood Event (% AEP)	Prospect Rd Gauge Height (m)	Rainfall Total (mm)			Rainfall Duration (Hours)
		Seaspray (Burong)	Stradbroke West	Mt Tassie	
1	6.36	134	193	295	48
1995	5.64	89	NA*	394	72
2	5.57	141	149	233	36
1993	5.53	111	NA*	267	40
5	4.82	125	136	210	48
10	3.78	105	113	178	48
2012	3.18	42	101	204	24

*Stradbroke West rainfall gauge was not installed

3.3.2 Flood Warning Levels

There are currently no flood warning gauge levels for Seaspray despite the presence of stream flow gauges at Prospect Rd and further upstream at Stradbroke West. Based on the information presented in Table 3-2 and the historical gauge record in Figure 3-3, recommendations are provided in Table 3-5 to establish flood warning levels at the Prospect Road gauge.

These levels seek to balance the need to ensure that flood warnings are implemented with reasonable consideration of frequency and impacts, and to provide valid warning time to allow preparation for an estimated flood peak. It is important to note that whilst no flood impact in Seaspray occurs dyue to flooding from Merriman Creek in the 2% AEP flood event, with a gauge height of 5.57m, and that the 1995 flood did not impact Seaspray at a gauge height 5.64m, a lower major flood warning level should provide adequate time to enact flood preparations.

Table 3-5 Proposed Flood Warning Levels

Flood Warning Level	Prospect Rd Height (m)
Minor	2.0
Moderate	3.0
Major	4.5

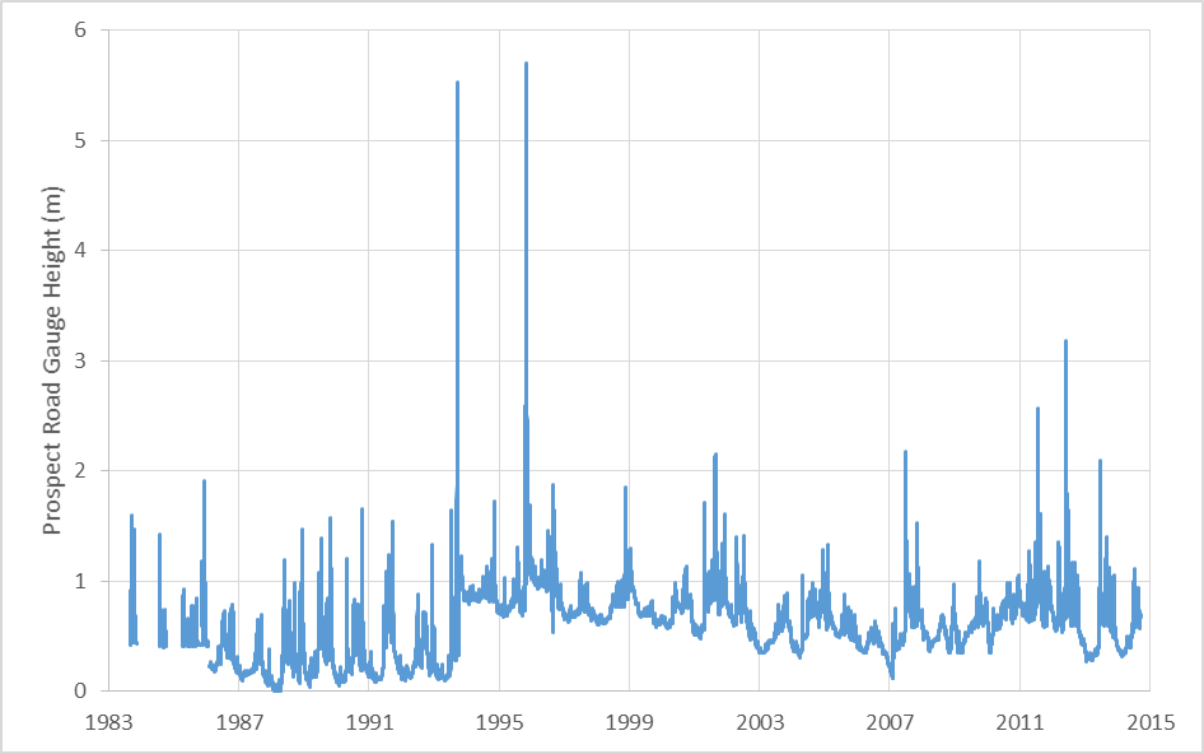

Figure 3-3 Prospect Road Gauge Height – Historical Record

3.4 Flood Management Scheme Operation

The existing operating procedure for of the Seaspray flood mitigation scheme, including the floodway regulator and manual opening of the estuary entrance is detailed in the operating manual maintained by Wellington Shire Council (Wellington Shire Council, 1996).

3.4.1 Regulator Structure

The intention of the regulator structure is to provide flood protection from both riverine and coastal flooding. In practical terms, if the sand berm is closed the regulator should maintain a pool level at 2.0 m AHD to 2.2 m AHD, which will preferentially direct river flows down the floodway to limit flows overtopping the berm and scouring an entrance channel. This therefore would prevent ingress of water from the ocean during extreme storm tide events. However, the analysis of coastal flooding reported in the Hydraulics Report (R03) has concluded that under existing conditions, there is no risk posed to Seaspray from coastal flooding as the 1% AEP storm tide elevation at Seaspray is 1.5 m AHD under existing mean sea level. The crest elevation of the existing levees along Merriman Creek are above this level and would prevent inundation for storm tides, regardless of the operation of the regulator structure.

The existing operating procedure (Wellington Shire Council, 1996) recommends that the regulator structure is to have boards incrementally added manually throughout the duration of a riverine flood event to limit and control flow down the floodway. In practice this has proven dangerous and impractical, as reported in the failed attempts to place flood boards during the 1993 flood event. Maintaining all boards in place within the regulator structure does however force flood water towards the estuary entrance and encourages earlier natural scouring of the entrance berm if the entrance channel is initially closed.

It is therefore recommended that in future all boards remain in place to provide protection against riverine flooding, as there is no flood benefit to removing them during an event.

3.4.2 Entrance Opening

Estuary closure as a result of sedimentation of the entrance and creation of a sand berm is a continued concern for local residents, with pooling of water within the estuary a perceived flood risk if riverine flooding is to occur. Results of sensitivity analysis within the Hydraulics Report (R03) showed that once overtopped, the sand berm will naturally erode within 1-3 hours through natural erosion processes.

However, to address local concern and to manage entrance opening conditions a safe operating height of 2.1 m AHD is proposed as a maximum berm level crest for the sand berm to open naturally without negative flood impacts in Seaspray. The proposed maximum height of 2.1 m AHD allows 100 mm of freeboard before the earthen weir adjacent the regulator structure is overtopped and water is diverted down the floodway. The height of 2.1 m AHD also provides 400 mm of freeboard to the crests of the levees along Merriman Creek. If the entrance sand berm is greater than 2.1 m AHD, manual opening of the entrance is recommended if weather warnings indicate significant rainfall is likely to occur in the catchment. This differs from the existing operating procedure for the structure as detailed in the operating manual. It is therefore recommended that the operating manual be updated to reflect this revised information.

There is currently no accurate measure of the berm height, although the water level behind the berm is recorded by the gauge at Seaspray. A water level gauge board located at the boat ramp or on the berm would allow Council, WGCMA and the local community to have up to date information on the sand levels and provide a trigger for implementing potential artificial openings of the entrance prior to predicted flood events.

3.4.3 Floodway Maintenance

Results of sensitivity analysis conducted for the Hydraulic Report (R03) showed the flood mitigation benefits associated with limiting the build-up of established vegetation or reeds within the floodway. Under a conservative modelling approach, the sensitivity results suggest that water levels could be increased by 100mm – 150mm on either side of the floodway if vegetation roughness (associated with extensive growth of tall reeds) is increased. It is therefore recommended that vegetation in the floodway is maintained as grass only.

3.5 Land Use Planning

The Victoria Planning Provisions (VPPs) contain a number of controls that can be employed to provide guidance for the use and development of land that is affected by inundation from floodwaters. These controls include the Floodway Overlay (FO), the Land Subject to Inundation Overlay (LSIO), the Special Building Overlay (SBO), the Urban Floodway Zone (UFZ) and the Environmental Significance Overlay (ESO).

Section 6(e) of the Planning and Environment Act 1987 enables planning schemes to 'regulate or prohibit any use or development in hazardous areas, or likely to be hazardous'. As a result, planning schemes contain State planning policy for floodplain management requiring, among other things, that flood risk be considered in the preparation of planning schemes and in land use decisions.

Guidance for applying flood controls to Planning Schemes is available from the Department of Planning and Community Development's (DPCD) Practice Note on Applying Flood Controls in Planning Schemes.

Planning Schemes can be viewed online at http://services.land.vic.gov.au/maps/pmo.jsp. It is recommended that the planning scheme for Seaspray be amended to reflect the flood risk identified by this project.

The method used to delineate the proposed FO is broadly based on the new Australian Rainfall and Runoff Project 10 'Appropriate Safety Criteria for People'. Criterion for delineating the flood overlay considers both vehicle and people safety, and are as follows, based on the 1% AEP flood:

- Depth > 0.3 m
- Velocity > 1.5 m/s
- Depth x velocity > 0.3 m^2/s.

It is understood that the WGCMA favours this method has and has approved development guidelines which adopt 0.30 m as the cut off flood level for safety considerations.

The Land Subject to Inundation (LSIO) extent has been taken as the full 1% AEP flood extent minus small disconnected puddles such as farm dams. Figure 3-4 shows the proposed FO and LSIO maps based on the Australian Rainfall and Runoff Revision Project 10 methodology.

Figure 3-4 Draft LSIO and FO Map for Existing Conditions

4. MITIGATION

Three structural mitigation options as identified in Figure 4-1 were presented to the steering committee and community meeting held in September 2015. The three options are listed below, and are described in further detail in the following sections.

1. **Increase Conveyance of Eastern Prior Stream** – It was proposed to assess whether deepening of Eastern Prior Stream to the inverts of the culvert at Seaspray Road would allow water to flow along Eastern Prior Stream and reconnect with Lake Reeve. This aims to reduce the flood flows directly towards Seaspray.
2. **Increase flood storage along Mason Creek** – It was proposed that additional storage of flood waters could be achieved by utilising the natural depression along Mason Creek towards Lake Denison. The aim was to reduce flood levels within the Merriman Creek estuary and consequently overtopping of the adjacent levees.
3. **Increase Existing Flood Levee Function** - The existing network of levees constructed around Seaspray as part of the flood mitigation scheme have ensured that Seaspray was not impacted during the 1995 or 2012 floods. Design modelling of the 1% AEP flood event, does however, show that the existing levee scheme remains vulnerable to overtopping and breakout flows during a 1% AEP event. Raising of levees in specific locations could be undertaken to eliminate this overtopping.

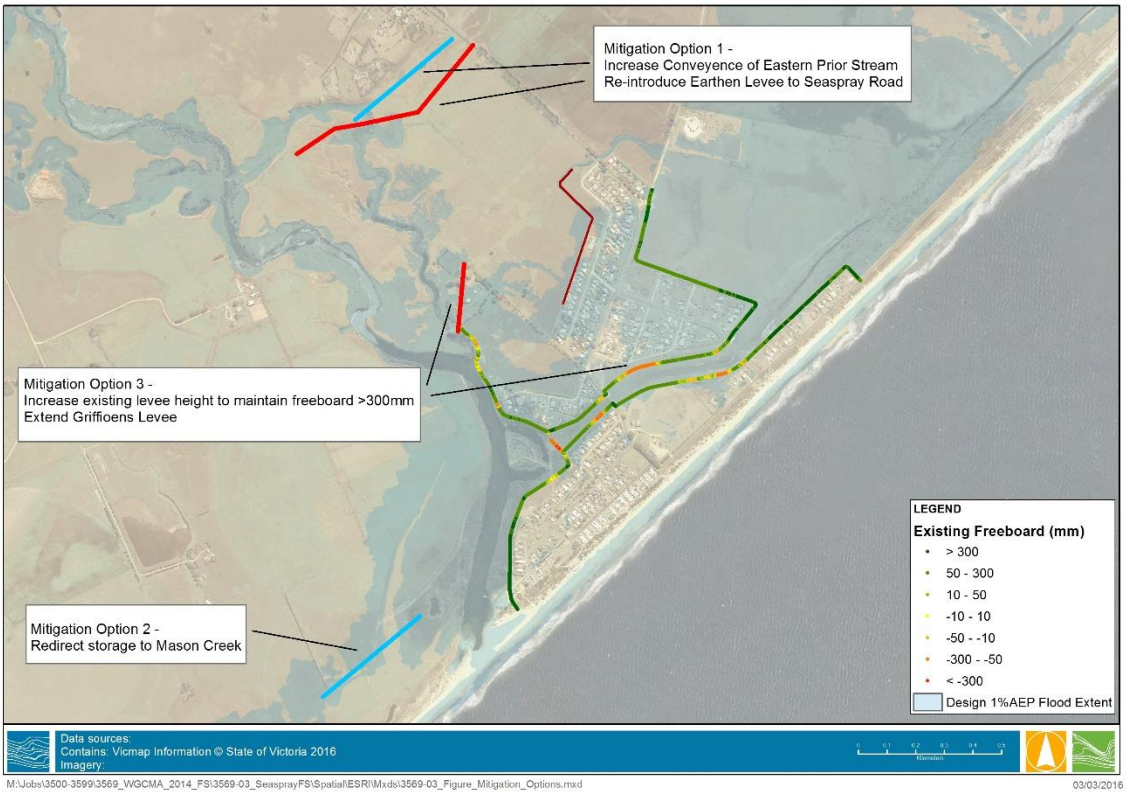

Figure 4-1 Proposed Mitigation Options

At Seaspray the operation of the floodway regulator structure and entrance opening are also important tools for managing flood risk. These aspects were discussed in the preceding section.

4.1 Prefeasibility Assessment

Each mitigation option was assessed against a number of criteria: potential reduction in flood damage, cost of construction, feasibility of construction, and environmental impact. The score for each criterion was based on a ranking system of 1 to 5, with 1 being the worst score and 5 the best. Each criteria score was then weighted according to the weighting shown in Table 4-1. The reduction in flood damage was the most heavily weighted criteria as this is really the main objective for all flood mitigation. Table 4-2 reviews and scores each mitigation option against the four criteria and calculates a total score for each option. The options with the higher scores indicate the more appropriate mitigation solutions for Seaspray. While these options were reviewed and scored individually it is important to consider a combination of options when developing a flood mitigation scheme.

Using the prefeasibility assessment above, the 3 identified mitigation options are listed in order of total weighted score as seen in Table 4-2.

Table 4-1 Ranking score for mitigation criteria

Score	Reduction in Flood Damages	Cost ($)	Feasibility/ Constructability	Environmental Impact
Weighting	**2**	**1**	**0.5**	**0.5**
5	Major reduction in flood damage	Less than $ 50,000	Excellent (Ease of construction and/or highly feasible option)	None
4	Moderate reduction in flood damage	$ 50,000 – $ 100,000	Good	Minor
3	Minor reduction in flood damage	$ 100,000 – $ 500,000	Average	Some
2	No reduction in flood damage	$ 500,000 – $ 1,000,000	Below Average	Major
1	Increase in flood damage	Greater than $ 1,000,000	Poor (No access to site and/or highly unfeasible option)	Extreme

Table 4-2 Mitigation option prefeasibility results

No.	Mitigation Option	Criteria				
		Damage Reduction	Cost	Feasibility/ Constructability	Environmental Impact	Score
1	Existing Levee Improvements	5	3	3	5	17
2	Mason Creek Storage	2	2	3	4	9.5
3	Eastern Prior Stream Conveyance	2	1	2	3	7.5

4.2 Structural Mitigation Options Modelled

Following the prefeasibility assessment, preliminary modelling was undertaken to analyse the potential for the three proposed structural mitigation options to have an impact on flood levels and extents and assess the potential costs and benefits for each option. All mitigation modelling has been undertaken with an initial entrance berm height of 2.1 m AHD and ponding of water in the estuary to this level. It is assumed that the entrance channel will form through the berm through natural scouring processes (described in detail in Report 3) over a period of 3 hours once the water level in the estuary exceeds 2.1 m AHD.

The mitigation works were costed based on a number of key references:

- Melbourne Water's standard rates for earthworks and pipe/headwall construction costs.
- Rawlinsons Australian Construction Handbook Rates (Rawlinsons, 2011)
- The United Kingdom Environmental Agency Temporary and Demountable Flood Protection Guide (EA UK, 2011)
- Comparison to cost estimates for similar mitigation works for other flood studies

4.2.1 Increase Conveyance of Eastern Prior Stream

Following the 1993 flood event, the existing culverts on Eastern Prior stream under Seaspray Road were upgraded to a bank of 5 rectangular box culverts with dimensions of 2 m wide and 1.5 m high and an upstream invert level of 4.02 m AHD. At the same time, earthen levees preventing flow from Eastern Prior Stream into Blind Creek during the 1993 flood event were removed. Design modelling of the 1% AEP flood event shows that flood water under existing conditions flows down Blind Creek with no overland flow continuing along Eastern Prior stream to Seaspray Road. The floodwater must pond to approximately 5.5 m AHD for flow to continue along Eastern Prior Stream to Seaspray Road. In comparison to the entrance of Blind Creek is about 3.8 m AHD, which therefore provides a preferential flow path.

Proposed deepening of Eastern Prior stream to the inverts of the culvert at Seaspray Road (4.02 m AHD) allows water to flow along Eastern Prior Stream and reconnect with Lake Reeve, bypassing Seaspray. Model results of this scenario as shown in Figure 4-2 and confirms that the formally dry Eastern Prior stream is now able to re-direct flow around Seaspray. However, the overall impact of flood levels in negligible. Despite the lower bed level of Eastern Prior stream, flood waters still preferentially flow down Blind Creek.

Interestingly, if the earthen levees present during the 1993 flood event are reinstated and extended to Seaspray Road, this would preclude water from flowing down Blind Creek and greatly increase the conveyance of Eastern Prior stream.

Under this scenario, the resulting flood impact map in Figure 4-3 shows the reduction of flows down Blind Creek reduces overbank flows at the confluence of Blind Creek and Merriman Creek adjacent to Griffioens Levee. Water surface levels are therefore reduced in Seaspray, along Merriman Creek and the floodway.

This does however change the flooding mechanisms in and around Seaspray. Flow from Eastern Prior stream now directly enters low lying land to the east of Seaspray and the Eastern Levee is vulnerable to overtopping. Under this mitigation scenario, areas of Seaspray bordering Merriman Creek and the floodway experience slightly reduced flooding, however there is a much greater risk of levee failure on the eastern side of Seaspray. This mitigation option is therefore not considered a preferred option as it shifts the location of levee vulnerability rather than resolving the issue.

4.2.2 Mason Creek Storage

The proposed increase in water storage in the natural depression along Mason Creek towards Lake Denison has been modelled to assess its effectiveness to relieve flood levels within the Merriman Creek Estuary and consequently overbank flow into Seaspray.

The model results showed that improving the hydraulic connection to the natural depression to the west of Merriman Creek did increase the capacity for water storage in this area. However, the additional storage is not sufficient to reduce water levels within Seaspray and there was only a marginal reduction in peak flood levels within the estuary itself. As such there was no tangible benefit from this mitigation option.

Figure 4-2 Flood Impact of Deepening Easter Prior Stream

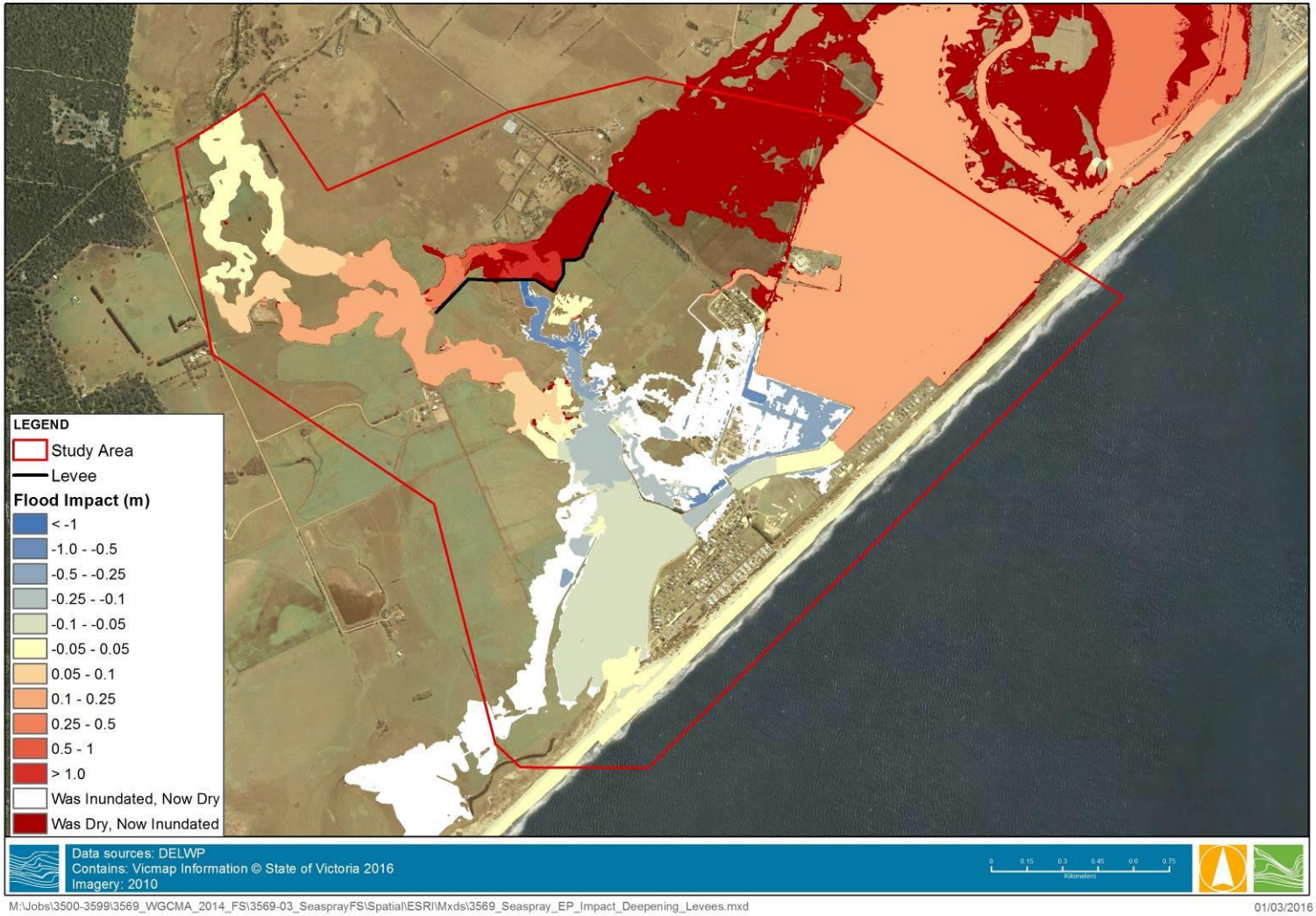

Figure 4-3 Flood Impact of Deepening Easter Prior Stream and reinstating levee across Blind Creek

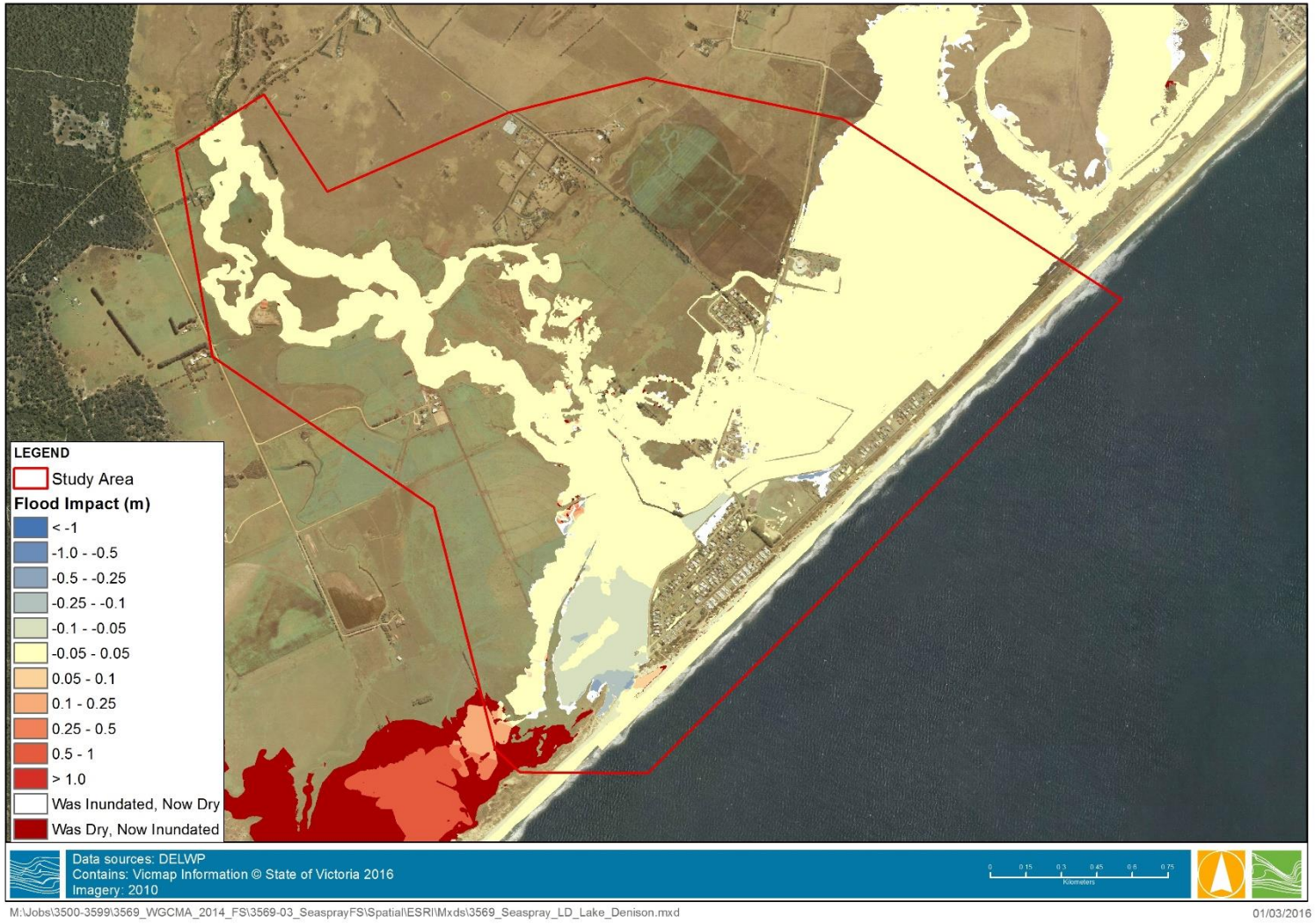

Figure 4-4 Flood Impact of Increased Water Storage in Mason Creek, towards Lake Denison

4.2.3 Increased Flood Levee Function

The existing network of levees constructed around Seaspray have ensured the town has not been impacted during the 1995 or 2012 floods. Design modelling of the 1% AEP flood event, does however, show that the existing levee scheme remains vulnerable to overtopping and breakout flows during a 1% AEP event.

For this assessment, all existing levees crest levels were elevated well above any potential flood level which has allowed identification of the integrity of the existing flood levees under 1% AEP flood event conditions. Figure 4-5 displays sections of the levee that would be overtopped under existing conditions with a 1% AEP flow if the levees are not raised. Thematic colours represent the existing crest level of each levee with respect to 1% AEP flood level. Whilst much of the levee system shows good capacity with a freeboard of greater than 50mm above modelled flood levels, several sections have crest levels lower than required levels. This assessment allows a targeted approach to raise underperforming sections of the levee and improve the levee network to mitigate flood levels in the 1% AEP flood event.

Figure 4-6 provides a longitudinal profile of Griffioens levee along the eastern edge of Merriman Creek, Government Road levee along the northern side of the floodway, and the eastern levee of Seaspray. The profile confirms that sections of the existing levee, most notably between Futcher Street and Centre Road, are lower than the design 1% AEP water surface level.

Figure 4-5 Vulnerability of existing levees in the 1% AEP flood event

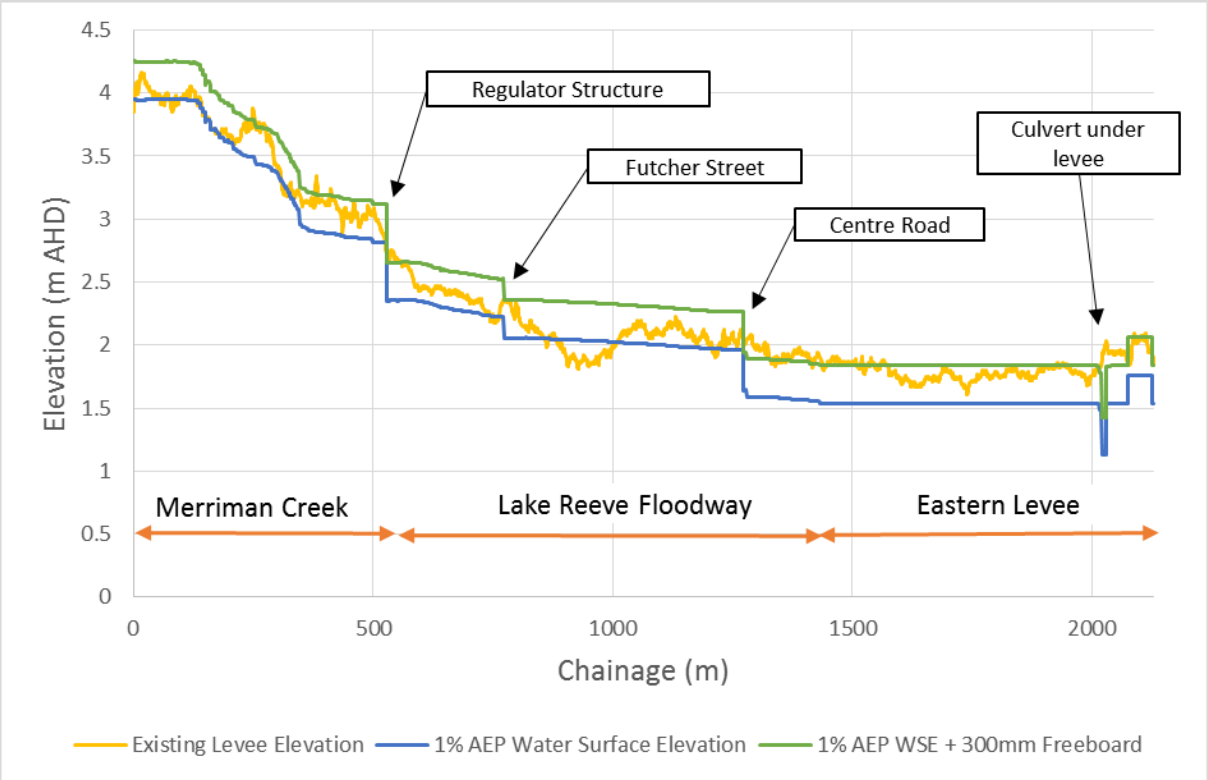

Figure 4-6 Longitudinal Profile of existing Griffioens Levee and Government Road Levee

In addition to the existing levee upgrade, an extension of Griffioens Levee would be required to prevent water from outflanking the existing levee. A conceptual alignment has been assessed, however this is not to be considered a final design layout. The raising of existing levees in required locations, and the addition of the Griffioens Levee extension, has limited flood impacts within Seaspray to those properties affected by localised rainfall and stormwater flooding as showing in Figure 4-7.

Initial cost estimations for an upgraded levee scheme are summarised in Table 4-3 .

Table 4-3 Levee Upgrade and Extension Costs

1. Government Road Levee				Construction Cost	Annual Maintenance
Description	**Qty**	**Unit**	**Rate**		
Construction and Compaction	529	m^3	22.4	$11,869.16	
Topsoiling	529	m^3	19.1	$10,086.67	
Grassing	2,193	m^2	1.1	$2,456.46	
SUB-TOTAL				$24,412.30	$732.37
Engineering Fee	1		15%	$3,661.84	
Administration Fee	1		9%	$2,197.11	
Contingencies	1		30%	$9,081.37	
TOTAL				$39,352.62	$732.37

2. Southern Levee				Construction Cost	Annual Maintenance
Description	**Qty**	**Unit**	**Rate**		
Construction and Compaction	395	m^3	22.4	$8,873.38	
Topsoiling	395	m^3	19.1	$7,540.79	
Grassing	2,651	m^2	1.1	$2,969.35	
SUB-TOTAL				$19,383.53	$581.51
Engineering Fee	1		15%	$2,907.53	
Administration Fee	1		9%	$1,744.52	
Contingencies	1		30%	$7,210.67	
TOTAL				$31,246.24	$581.51

3. Griffieons Levee				Construction Cost	Annual Maintenance
Description	**Qty**	**Unit**	**Rate**		
Construction and Compaction	190	m^3	22.4	$4,256.63	
Topsoiling	190	m^3	19.1	$3,617.38	
Grassing	271	m^2	1.1	$303.30	
SUB-TOTAL				$8,177.32	$245.32
Engineering Fee	1		15%	$1,226.60	
Administration Fee	1		9%	$735.96	
Contingencies	1		30%	$3,041.96	
TOTAL				$13,181.83	$245.32

Figure 4-7 Flood Impact of raising all levees about 1% AEP flood level

5. FLOOD DAMAGES

5.1 Overview

A flood damages assessment was undertaken for the study area under existing conditions. The flood assessment determined the monetary flood damages for design floods (10%, 5%, 2%, 1% and 0.5% AEP events). The flood damage assessment was also undertaken for the final mitigation package.

Water Technology has developed an industry best practice damage assessment methodology that has been utilised for a number of studies in Victoria, combining aspects of the Rapid Appraisal Method, ANUFLOOD, more recent damage curves from the NSW Office of Environment and Heritage and other relevant flood damage literature. The model results for all mapped flood events were processed to calculate the numbers and locations of properties affected. This included properties with buildings inundated above floor, properties with buildings inundated below floor and properties where the building was not impacted but the grounds of the property were. In addition to the flood affected properties, lengths of flood affected roads for each event were also calculated. Note, that rural agricultural damages have not been included in this study as the focus for mitigation is on the township.

5.2 Existing Conditions

A flood damages assessment was undertaken on existing conditions and is shown in Table 5-1. The 1% AEP damage calculated was **$2,259,374** with 36 residential properties flooded above floor and 1 commercial property also flooded above floor. The average annual damage (AAD), a measure of the flood damage, per year over an extended period was estimated for existing conditions to be **$46,124**. The AAD is an estimate of the cost of flooding to the community that includes both public and privately owned assets.

Table 5-1 Existing Conditions Flood Damages Summary

EXISTING CONDITIONS					
ARI (years)	200yr	100yr	50yr	20yr	10yr
AEP	0.005	0.01	0.02	0.05	0.1
Residential Buildings Flooded Above Floor	166	36	0	0	0
Commercial Buildings Flooded Above Floor	14	1	0	0	0
Properties Flooded Below Floor	142	177	58	57	56
Total Properties Flooded	**322**	**214**	**58**	**57**	**56**
Direct Potential External Damage Cost	$1,218,495	$738,020	$60,090	$48,791	$48,733
Direct Potential Residential Damage Cost	$9,992,403	$1,997,493	$0	$0	$0
Direct Potential Commercial Damage Cost	$170,813	$3,779	$0	$0	$0
Total Direct Potential Damage Cost	**$11,381,711**	**$2,739,292**	**$60,090**	**$48,791**	**$48,733**
Total Actual Damage Cost *(0.8*Potential)*	**$9,105,369**	**$2,191,434**	**$48,072**	**$39,033**	**$38,986**
Infrastructure Damage Cost	**$160,563**	**$67,940**	**$35,906**	**$32,534**	**$19,876**
Indirect Clean Up Cost					
Indirect Residential Relocation Cost					
Indirect Emergency Response Cost					
Total Indirect Cost	**$0**	**$0**	**$0**	**$0**	**$0**
Total Cost	**$9,265,932**	**$2,259,374**	**$83,978**	**$71,567**	**$58,862**

5.3 Levee Improvement Mitigation

Damages were costed for mitigation Option 3, the upgrade of the existing levee mitigation scheme. This option aims to prevent flooding of Seaspray under the 1% AEP design flow from Merriman

Creek. It does not address local stormwater flooding. The results (Table 5-2) showed that the number of residential properties flooded above floor in a 1% AEP event are reduced to 4, and no commercial properties are now flooded above floor level. The flooding of these properties is limited to localised rainfall and stormwater flooding. This reduced the flood damage estimate for a 1% AEP flood event to **$429,895**. The AAD was also reduced to **$33,413**.

Table 5-2 Levee Mitigation Flood Damages Summary

MITIGATION CONDITIONS					
ARI (years)	200yr	100yr	50yr	20yr	10yr
AEP	0.005	0.01	0.02	0.05	0.1
Residential Buildings Flooded Above Floor	158	4	0	0	0
Commercial Buildings Flooded Above Floor	1	0	0	0	0
Properties Flooded Below Floor	125	212	58	57	56
Total Properties Flooded	**284**	**216**	**58**	**57**	**56**
Direct Potential External Damage Cost	$462,331	$324,188	$60,090	$48,791	$48,733
Direct Potential Residential Damage Cost	$11,480,148	$168,532	$0	$0	$0
Direct Potential Commercial Damage Cost	$19,781	$0	$0	$0	$0
Total Direct Potential Damage Cost	**$11,962,260**	**$492,720**	**$60,090**	**$48,791**	**$48,733**
Total Actual Damage Cost *(0.8*Potential)*	**$9,569,808**	**$394,176**	**$48,072**	**$39,033**	**$38,986**
Infrastructure Damage Cost	**$100,203**	**$35,719**	**$35,906**	**$32,534**	**$19,876**
Indirect Clean Up Cost					
Indirect Residential Relocation Cost					
Indirect Emergency Response Cost					
Total Indirect Cost	**$0**	**$0**	**$0**	**$0**	**$0**
Total Cost	**$9,670,011**	**$429,895**	**$83,978**	**$71,567**	**$58,862**

6. BENEFIT COST ANALYSIS

Table 6-1 Benefit-Cost Analysis of Levee Mitigation Option

Item	Existing Conditions	Levee Mitigation Option
Annual Average Damages	**$46,124**	**$33,413**
Annual Maintenance Cost*		**$1,559**
Annual Cost Saving		$11,152
Net Present Value (6%)		**$156,821**
Capital Cost of Mitigation		**$83,781**
Benefit-Cost Ratio		**1.87**

* It should be noted that any maintenance cost associated with the proposed mitigation works are only in relation to the proposed additional works and do not consider the existing ongoing cost of maintenance to the existing structure.

The levee improvement mitigation option shows a positive benefit to cost ratio due to the relatively limited extent of levee raising required and associated costs compared to the reduction of flood impacted properties in the 1% AEP flood event. The magnitude of the 0.5% AEP flood event is such that raising the existing levees is not able to prevent Seaspray from becoming inundated. Overbank flow from Blind Creek continues to outflank the existing levee arrangement with breakout flows occurring all the way along Blind Creek to Eastern Prior stream.

6.1 Non-Economic Flood Damages

The previous discussion relating to flood damages has concentrated on monetary damages, that is, damages that are easily quantified. In addition to those damages, it is widely recognised that individuals and communities also suffer significant non-monetary damage, i.e. emotional distress, health issues, etc. There has been extensive research undertaken and documented in the scientific literature relating to the individuals and communities response to natural disasters. A recent publication entitled *"Understanding floods: Questions and Answers"* by the Queensland Floods Science Engineering and Technology Panel, when discussing the large social consequences floods have on individuals and communities states:

Floods can also traumatise victims and their families for long periods of time. The loss of loved ones has deep impacts, especially on children. Displacement from one's home, loss of property and disruption to business and social affairs can cause continuing stress. For some people the psychological impacts can be long lasting.

The *"Disaster Loss Assessment Guidelines"* (EMA, 2002) make the following key points:

- *Intangibles are often found to be more important than tangible losses.*
- *Most research shows that people value the intangible losses from a flooded home—principally loss of memorabilia, stress and resultant ill-health—as at least as great as their tangible dollar losses.*
- *There are no agreed methods for valuing these losses.*

There is no doubt that the intangible non-monetary flood related damage in Seaspray is high. The benefit-cost analysis presented later in this report has not considered this cost. Nor has the perceived reduction in property value as a result of land not currently zoned within the flood overlay being placed within the updated flood overlay if no mitigation option is implemented. The cost benefit analysis has also not taken into account the possibility for land currently zoned within the flood overlay or land subject to inundation which may have the flood risk significantly reduced as a result of the mitigation options discussed. Any decisions made that are based on the benefit-cost ratios need to understand that the true cost of floods in Seaspray is far higher than the economic damages alone. This would have the effect of increasing the benefit cost ratio, improving the argument for approving a mitigation scheme at Seaspray.

7. CONCLUSION AND RECOMMENDATIONS

The hydraulic modelling undertaken for the Seaspray flood study has allowed for locations within Seaspray that pose a high flood risk to be identified. It has been shown that at Seaspray the operation of the floodway regulator structure and entrance opening are important tools for managing flood risk.

The modelling has also identified a number of potential structural mitigation options to reduce flood risk, although only one of the structural mitigation options shows significant benefits to flood risk reduction in the township. The updating of the floodway and entrance channel operating procedure, and the potential targeted increased in flood levee heights, along with the updated planning information aim to treat the existing risk within Seaspray.

It is recommended that the WGCMA and Wellington Shire Council develop an entrance opening protocol for Merriman Creek as part of updating the operating procedure for the floodway regulator structure. This should address the opening of the entrance during flood events and clearly outline responsibilities including safety and timing of any artificial opening works. There is also currently no accurate measure of the berm height, although the water level behind the berm is recorded by the

gauge at Seaspray. A water level gauge board located at the boat ramp or on the berm would allow Council, WGCMA and the local community to have up to date information on the sand levels and provide a trigger for implementing potential artificial openings of the entrance prior to predicted flood events.

To implement the targeted levee raising option at Seaspray detailed design of the levee structures is required which may require geotechnical investigations .

Implementation of the planning scheme amendments will rely upon Wellington Shire Council who have been part of the steering committee throughout the project.

Through the series of steering committee and community meetings, it was identified that accessing information about an approaching flood event was often difficult. Currently the Bureau of Meteorology (BoM) provide flood warnings via the BoM website, while streamflow data is also available through a different section of the website as well as through the DELWP data monitoring website.

It was noted that having a community portal that incorporated several key pieces of information regarding flooding specific to Seaspray in one place may reduce some of the confusion about where this information can be obtained. Allowing community members to get important information will likely raise the resilience of locals to potential flooding issues. This information may include any warnings issued by the BoM, the two streamflow gauges on Merriman Creek and a radar image of the area to show if there is more rain approaching. Regular monitoring of the berm height and height of the water in the estuary could be incorporated. Flood extent maps which identify the houses impacted during a major flood event could also be included within a community portal.

In terms of structural mitigation options, it was found that targeted raising of levees in and around Seaspray has the potential to significant reduce flood damage and costs for the 1% AEP event and have a favourable benefit to cost ratio.

8. REFERENCES

DELWP (2015), *Victorian Water Monitoring web portal*, Department of Environment, Land, Water and Planning, accessed April 29, 2015.

EA (2014). *Australian Rainfall and Runoff Discussion Paper: An Interim Guideline for considering Climate Change in Rainfall and Runoff*. Engineers Australia

HydroTechnology (1995), *Documentation and review of 1993 Victorian Floods - Gippsland Floods September 1993 Volume 1 and 2*

Rawlinsons (2011) Australian Construction Handbook Rates

The United Kingdom Environmental Agency Temporary and Demountable Flood Protection Guide (EA UK, 2011)

Wellington Shire Council (1996). Seaspray Flood Mitigation Scheme – Operating Procedures, Amended October 1996, Wellington Municipal Emergency Management Plan

APPENDIX A – PROPERTIES INUNDATED

Easting	Northing	Floor Level	Ground Level	Building Type	Address	Description	0.5% AEP Depth Above Floor	1% AEP Depth Above Floor	2% AEP Depth Above Floor	5% AEP Depth Above Floor	10% AEP Depth Above Floor
516520.7	5753105	3.465	2.053	RES	43 MAIN RD		-1.253	-1.481	N/A	N/A	N/A
516612.8	5752872	3.34	1.429	RES	10 NEWTON ST		-1.21	-1.508	-1.878	-1.878	-1.878
516507.2	5753380	3.142	2.485	RES	77 MAIN RD		-0.699	-0.699	-0.699	-0.699	-0.699
516546.3	5753336	2.976	2.157	RES	71 MAIN RD		-0.667	N/A	N/A	N/A	N/A
516226.9	5752190	2.973	2.079	RES	44 BUCKLEY ST		-0.572	N/A	N/A	N/A	N/A
516095.8	5752668	3.615	2.708	RES	36-38 GOVERNMENT RD		-0.538	-0.818	N/A	N/A	N/A
516264	5752624	3.261	2.354	RES	27 GOVERNMENT RD		-0.513	-0.803	N/A	N/A	N/A
516600.6	5753335	2.451	1.933	RES	68 MAIN RD		-0.455	N/A	N/A	N/A	N/A
516499	5752473	2.807	1.935	RES	6 BUCKLEY ST	STOOP	-0.452	N/A	N/A	N/A	N/A
516476.3	5752521	2.913	1.976	RES	5 IRVING ST		-0.443	N/A	N/A	N/A	N/A
516563.3	5753217	2.576	1.758	RES	57 MAIN RD		-0.437	-0.67	N/A	N/A	N/A
516781.8	5752955	2.478	1.405	RES	20 HANSEN ST		-0.435	-0.653	N/A	N/A	N/A
516373.7	5752413	2.912	1.797	RES	23 IRVING ST		-0.423	-0.998	N/A	N/A	N/A
516359.9	5752826	3.14	2.597	RES	4 DAVIES ST		-0.418	N/A	N/A	N/A	N/A
516448.5	5753335	2.948	2.409	RES	38 ELLEN AVE		-0.41	N/A	N/A	N/A	N/A
516449.8	5752245	2.709	1.843	RES	23 FORESHORE RD		-0.382	N/A	N/A	N/A	N/A

516304.6	5752263	2.78	1.672	RES	34 BUCKLEY ST	STOOP	-0.378	N/A	N/A	N/A	N/A
516431.4	5753152	2.91	2.114	RES	1-9 ELLEN AVE		-0.362	-0.785	N/A	N/A	N/A
516516.1	5753077	2.605	2.024	RES	39 MAIN RD		-0.361	-0.57	N/A	N/A	N/A
516432.5	5752241	2.658	2.353	RES	25 FORESHORE RD	GRANNY FLAT	-0.326	N/A	N/A	N/A	N/A
517222.3	5752919	2.283	1.781	RES	43 SHORELINE DR		-0.322	N/A	N/A	N/A	N/A
516321.6	5752819	3.097	2.68	RES	3 DAVIES ST		-0.316	N/A	N/A	N/A	N/A
517167	5752868	2.277	1.469	RES	39 SHORELINE DR		-0.303	N/A	N/A	N/A	N/A
516259.2	5752591	3.061	2.325	RES	27 GOVERNMENT RD	GRANNY FLAT	-0.298	-0.564	N/A	N/A	N/A
516547.1	5752336	2.588	1.701	RES	11 FORESHORE RD		-0.294	N/A	N/A	N/A	N/A
516347	5752887	3.047	2.031	RES	11 DAVIES ST		-0.293	-0.674	N/A	N/A	N/A
516354.4	5752213	2.687	1.905	RES	32 BEARUP ST		-0.286	N/A	N/A	N/A	N/A
516517.5	5752958	2.52	1.888	RES	24 MAIN RD		-0.285	N/A	N/A	N/A	N/A
517030.5	5752742	2.366	1.525	RES	21 SHORELINE DR		-0.284	N/A	N/A	N/A	N/A
516458.9	5753327	2.812	2.368	RES	36 ELLEN AVE		-0.28	N/A	N/A	N/A	N/A
516512.5	5752494	2.611	1.595	RES	4 BUCKLEY ST	STOOP	-0.267	-0.861	-0.861	-0.861	-0.861
516520	5752310	2.572	1.775	RES	15 FORESHORE RD		-0.266	N/A	N/A	N/A	N/A
516521.7	5752778	2.523	1.798	RES	3 HANSEN ST		-0.26	N/A	N/A	N/A	N/A
516403.1	5752763	2.884	2.088	RES	1 MAIN RD		-0.245	-0.502	N/A	N/A	N/A
516441.1	5752305	2.601	2.149	RES	20 BEARUP ST		-0.241	N/A	N/A	N/A	N/A
516415.1	5752390	2.664	2.033	RES	18 BUCKLEY ST	STOOP	-0.24	N/A	N/A	N/A	N/A
516339.5	5752868	2.984	2.193	RES	9 DAVIES ST	STOOP	-0.228	-0.614	N/A	N/A	N/A

517343.4	5753034	2.152	1.65	RES	57-59 SHORELINE DR		-0.221	N/A	N/A	N/A	N/A
516549.8	5752966	2.317	1.67	RES	2 CENTRE RD		-0.22	-0.488	N/A	N/A	N/A
516420.9	5753007	2.8	2.024	RES	28 DAVIES ST		-0.215	-0.581	N/A	N/A	N/A
516488.3	5752898	2.567	1.797	RES	18 MAIN RD		-0.214	-0.684	N/A	N/A	N/A
516508.1	5753064	2.499	1.871	RES	37 MAIN RD		-0.213	-0.452	N/A	N/A	N/A
516861.8	5752905	2.264	1.248	RES	23 CENTRE RD		-0.212	-0.433	N/A	N/A	N/A
516778.7	5752861	2.302	1.263	RES	18 CENTRE RD	MAIN DWELLING	-0.211	-0.469	N/A	N/A	N/A
517287.8	5752979	2.148	1.705	RES	51 SHORELINE DR		-0.21	N/A	N/A	N/A	N/A
516874.3	5752950	2.227	1.188	RES	3 CATTON ST		-0.205	-0.399	N/A	N/A	N/A
516464.7	5753239	2.735	2.035	RES	15 ELLEN AVE		-0.201	-0.66	N/A	N/A	N/A
516562.7	5752801	2.411	1.642	RES	1 NEWTON ST		-0.196	-0.554	N/A	N/A	N/A
516187.8	5752043	2.589	2.19	RES	11 TROOD ST		-0.19	N/A	N/A	N/A	N/A
516255.1	5752082	2.584	1.721	RES	48 BEARUP ST		-0.189	-0.698	-0.698	-0.698	-0.698
516474.3	5753166	2.698	1.98	RES	14 ELLEN AVE		-0.184	-0.621	N/A	N/A	N/A
516454.4	5752393	2.567	1.92	RES	13 BUCKLEY ST		-0.182	N/A	N/A	N/A	N/A
517049.2	5752752	2.242	1.59	RES	23 SHORELINE DR		-0.181	N/A	N/A	N/A	N/A
516368.3	5752158	2.551	2.187	RES	35 FORESHORE RD		-0.172	N/A	N/A	N/A	N/A
516556.9	5753321	2.455	1.922	RES	69 MAIN RD		-0.171	N/A	N/A	N/A	N/A
516242.1	5752200	2.57	1.962	RES	42 BUCKLEY ST		-0.169	N/A	N/A	N/A	N/A
516271.1	5752545	2.867	2.389	RES	7 ROWLEY ST		-0.159	-0.478	N/A	N/A	N/A
516609	5752848	2.307	1.45	RES	8 NEWTON ST		-0.158	-0.474	N/A	N/A	N/A

516709.6	5752856	2.258	1.381	RES	19 HANSEN ST		-0.154	-0.424	N/A	N/A	N/A
516538.9	5753152	2.308	1.868	RES	49 MAIN RD		-0.148	-0.428	N/A	N/A	N/A
516180.6	5752118	2.548	1.812	RES	1 TROOD ST		-0.147	N/A	N/A	N/A	N/A
516368.1	5752784	2.834	2.642	RES	2 DAVIES ST		-0.143	N/A	N/A	N/A	N/A
516218.8	5752622	3.016	2.348	RES	31-33 GOVERNMENT RD		-0.14	-0.363	N/A	N/A	N/A
516385	5752184	2.511	2.258	RES	31 FORESHORE RD		-0.139	N/A	N/A	N/A	N/A
516452	5752316	2.486	2.329	RES	18 BEARUP ST		-0.138	N/A	N/A	N/A	N/A
517210	5752916	2.103	1.571	RES	41 SHORELINE DR		-0.137	N/A	N/A	N/A	N/A
516527.8	5753124	2.31	1.906	RES	45 MAIN RD		-0.133	-0.412	N/A	N/A	N/A
516464.6	5752250	2.456	1.812	RES	21 FORESHORE RD		-0.132	N/A	N/A	N/A	N/A
516284.7	5752107	2.523	2.072	RES	44 BEARUP ST		-0.129	N/A	N/A	N/A	N/A
516375	5752690	2.814	2.119	RES	6 GOVERNMENT RD		-0.127	-0.433	N/A	N/A	N/A
516564.6	5753308	2.379	1.806	RES	67 MAIN RD		-0.124	-0.47	N/A	N/A	N/A
516385.9	5752853	2.802	2.219	RES	10 DAVIES ST		-0.12	-0.465	N/A	N/A	N/A
517239.7	5752937	2.069	1.578	RES	45 SHORELINE DR		-0.118	N/A	N/A	N/A	N/A
516208.3	5752161	2.514	1.895	RES	48 BUCKLEY ST		-0.113	N/A	N/A	N/A	N/A
516374.2	5752174	2.478	1.952	RES	33 FORESHORE RD		-0.101	N/A	N/A	N/A	N/A
516344.2	5752202	2.501	1.796	RES	34 BEARUP ST		-0.1	-0.542	-0.542	-0.542	-0.542
516715.9	5752899	2.18	1.328	RES	14 CENTRE RD		-0.098	-0.349	N/A	N/A	N/A
516200.5	5752627	3.027	2.53	RES	35 GOVERNMENT RD		-0.097	-0.305	N/A	N/A	N/A

516563.1	5753296	2.338	1.787	RES	65 MAIN RD		-0.095	-0.43	N/A	N/A	N/A
516482.7	5753033	2.498	1.999	RES	33 MAIN RD		-0.092	-0.339	N/A	N/A	N/A
516484.6	5753300	2.615	2.065	RES	32 ELLEN AVE		-0.091	N/A	N/A	N/A	N/A
516544.5	5753176	2.261	1.661	RES	51 MAIN RD		-0.089	-0.367	N/A	N/A	N/A
516380.4	5752705	2.773	2.199	RES	4 GOVERNMENT RD		-0.087	-0.391	N/A	N/A	N/A
516898.3	5752899	2.124	1.24	RES	2 CATTON ST		-0.083	-0.293	N/A	N/A	N/A
516177.6	5752628	3.086	2.603	RES	37-39 GOVERNMENT RD		-0.081	-0.326	N/A	N/A	N/A
517270.5	5752965	2.024	1.679	RES	49 SHORELINE DR		-0.08	N/A	N/A	N/A	N/A
516429.1	5753024	2.628	2.043	RES	30 DAVIES ST		-0.078	-0.428	N/A	N/A	N/A
517299.4	5752996	2.012	1.6	RES	53 SHORELINE DR		-0.077	N/A	N/A	N/A	N/A
516382.3	5752889	2.769	2.151	RES	12 DAVIES ST		-0.076	-0.436	N/A	N/A	N/A
516762.7	5753002	2.091	1.302	RES	25 HANSEN ST	STOOP	-0.074	-0.271	N/A	N/A	N/A
516445.5	5753076	2.612	2.155	RES	2 ELLEN AVE		-0.073	-0.431	N/A	N/A	N/A
516180.1	5752020	2.47	1.885	RES	13 TROOD ST		-0.073	N/A	N/A	N/A	N/A
516491.3	5752778	2.352	2.182	RES	1 HANSEN ST		-0.07	N/A	N/A	N/A	N/A
516668.7	5752794	2.217	1.612	RES	11-13 HANSEN ST		-0.068	-0.37	N/A	N/A	N/A
516357.2	5752839	2.795	2.35	RES	6 DAVIES ST		-0.064	-0.438	N/A	N/A	N/A
516950.9	5752679	2.227	1.417	RES	15 SHORELINE DR		-0.063	-0.848	-0.848	-0.849	-0.849
516390.7	5753003	2.717	2.068	RES	25 DAVIES ST		-0.06	-0.462	N/A	N/A	N/A
516289.2	5752251	2.462	1.802	RES	36 BUCKLEY ST		-0.059	N/A	N/A	N/A	N/A

516679.7	5752948	2.134	1.299	RES	11 CENTRE RD		-0.057	-0.305	N/A	N/A	N/A
516967.7	5752695	2.208	1.568	RES	17 SHORELINE DR		-0.057	N/A	N/A	N/A	N/A
516560.4	5752342	2.341	1.678	RES	9 FORESHORE RD		-0.053	N/A	N/A	N/A	N/A
516402.7	5753048	2.666	2.064	RES	31 DAVIES ST		-0.051	-0.437	N/A	N/A	N/A
516510.6	5753265	2.514	1.987	RES	26 ELLEN AVE		-0.048	-0.448	N/A	N/A	N/A
516572.5	5752357	2.326	1.636	RES	7 FORESHORE RD		-0.045	N/A	N/A	N/A	N/A
516233.5	5752068	2.433	1.82	RES	50 BEARUP ST		-0.038	N/A	N/A	N/A	N/A
517250.5	5752948	1.979	1.598	RES	47 SHORELINE DR		-0.031	N/A	N/A	N/A	N/A
516599.2	5752898	2.147	1.464	RES	11 NEWTON ST		-0.03	-0.317	N/A	N/A	N/A
516237.8	5752565	2.971	2.432	RES	11 ROWLEY ST		-0.028	-0.225	N/A	N/A	N/A
516531.1	5752514	2.336	1.694	RES	2 BUCKLEY ST	STOOP	-0.023	N/A	N/A	N/A	N/A
516441.8	5752378	2.416	2.004	RES	17 BUCKLEY ST	STOOP	-0.017	N/A	N/A	N/A	N/A
516402.3	5752947	2.668	1.922	RES	20 DAVIES ST		-0.017	-0.388	N/A	N/A	N/A
516501.7	5753042	2.3	1.97	RES	35 MAIN RD		-0.015	-0.211	N/A	N/A	N/A
516626.4	5752798	2.185	1.681	RES	9 HANSEN ST		-0.007	-0.319	N/A	N/A	N/A
516450.3	5752418	2.411	1.926	RES	14 BUCKLEY ST		-0.003	N/A	N/A	N/A	N/A
516188.3	5752064	2.401	1.944	RES	7 TROOD ST		-0.001	N/A	N/A	N/A	N/A
516850.1	5752849	2.09	1.098	RES	24 CENTRE RD		-0.001	-0.256	N/A	N/A	N/A
516303.3	5752138	2.387	1.966	RES	39 FORESHORE RD		0.007	N/A	N/A	N/A	N/A
516418.5	5752474	2.496	1.639	RES	15 IRVING ST		0.009	-0.582	N/A	N/A	N/A
516981.4	5752714	2.121	1.692	RES	19 SHORELINE DR		0.01	-0.742	-0.742	-0.743	-0.743

516511.9	5752921	2.268	1.737	RES	22 MAIN RD		0.011	-0.401	N/A	N/A	N/A
516887.5	5752969	1.994	1.291	RES	5 CATTON ST		0.013	-0.166	N/A	N/A	N/A
516293.2	5752124	2.377	1.962	RES	42 BEARUP ST		0.017	N/A	N/A	N/A	N/A
516486.4	5752531	2.445	2.053	RES	3 IRVING ST		0.017	N/A	N/A	N/A	N/A
516459.7	5752809	2.427	2.471	RES	10 MAIN RD		0.018	N/A	N/A	N/A	N/A
516504.5	5753203	2.419	2.077	RES	20 ELLEN AVE		0.021	-0.392	N/A	N/A	N/A
516466.4	5752835	2.393	2.188	RES	12 MAIN RD		0.022	N/A	N/A	N/A	N/A
516553.9	5753196	2.126	1.671	RES	55 MAIN RD		0.025	-0.225	N/A	N/A	N/A
516188.4	5752081	2.372	1.929	RES	5 TROOD ST		0.028	N/A	N/A	N/A	N/A
516736.9	5752828	2.078	1.436	RES	16 HANSEN ST		0.034	-0.242	N/A	N/A	N/A
516415	5752792	2.523	1.986	RES	5 MAIN RD		0.037	-0.141	-0.283	-0.283	-0.283
516736.6	5752844	2.065	1.32	RES	18 HANSEN ST		0.039	-0.23	N/A	N/A	N/A
516492.7	5753295	2.474	2.037	RES	30 ELLEN AVE	STOOP	0.041	N/A	N/A	N/A	N/A
516290.6	5752618	2.677	2.148	RES	25 GOVERNMENT RD		0.043	-0.262	N/A	N/A	N/A
516703.4	5752912	2.036	1.21	RES	12 CENTRE RD		0.044	-0.206	N/A	N/A	N/A
516412.5	5753083	2.514	2.098	RES	35 DAVIES ST		0.051	-0.29	N/A	N/A	N/A
516251.4	5752626	2.72	2.291	RES	29 GOVERNMENT RD		0.051	-0.235	N/A	N/A	N/A
516480.9	5752347	2.273	1.839	RES	14 BEARUP ST		0.054	N/A	N/A	N/A	N/A
516459.8	5752922	2.377	1.672	RES	21 MAIN RD		0.061	-0.13	N/A	N/A	N/A
516500.9	5752910	2.254	1.88	RES	20 MAIN RD		0.07	N/A	N/A	N/A	N/A
516321.4	5752613	2.617	2.174	RES	21 GOVERNMENT RD		0.071	-0.233	N/A	N/A	N/A

516474.1	5752412	2.298	1.848	RES	9 BUCKLEY ST	STOOP	0.073	N/A	N/A	N/A	N/A
516310.6	5752615	2.619	2.048	RES	23 GOVERNMENT RD		0.077	-0.231	N/A	N/A	N/A
516674.9	5752920	2.001	1.235	RES	10 CENTRE RD		0.081	-0.171	N/A	N/A	N/A
516537.9	5752767	2.172	1.925	RES	5 HANSEN ST		0.082	N/A	N/A	N/A	N/A
516451.1	5753095	2.446	2.208	RES	4 ELLEN AVE	STOOP	0.087	-0.278	N/A	N/A	N/A
516574.6	5753254	2.066	1.576	RES	61 MAIN RD		0.093	-0.157	N/A	N/A	N/A
516258.5	5752101	2.3	2.236	RES	46 BEARUP ST		0.096	N/A	N/A	N/A	N/A
516533.2	5753357	2.303	2.444	RES	73 MAIN RD		0.096	N/A	N/A	N/A	N/A
516187.7	5752051	2.301	2.198	RES	9 TROOD ST		0.098	N/A	N/A	N/A	N/A
516133	5752610	2.948	2.13	RES	43-45 GOVERNMENT RD	STOOP	0.099	-0.178	N/A	N/A	N/A
516597.2	5752778	2.108	1.803	RES	7 HANSEN ST	STOOP	0.104	-0.222	N/A	N/A	N/A
516335.6	5752611	2.573	1.952	RES	19 GOVERNMENT RD		0.105	-0.192	N/A	N/A	N/A
516468.1	5753319	2.421	2.431	RES	34 ELLEN AVE		0.107	N/A	N/A	N/A	N/A
516466.6	5752302	2.216	2.024	RES	18 BOCK ST		0.107	N/A	N/A	N/A	N/A
516524.7	5752393	2.181	1.911	RES	8 BEARUP ST		0.113	N/A	N/A	N/A	N/A
516435.2	5752231	2.217	1.865	RES	25 FORESHORE RD		0.117	N/A	N/A	N/A	N/A
516402.3	5752960	2.537	2.085	RES	22 DAVIES ST		0.122	-0.261	N/A	N/A	N/A
516482	5753182	2.378	2.064	RES	16 ELLEN AVE		0.125	-0.304	N/A	N/A	N/A
516775.5	5752938	1.932	1.359	RES	17 CENTRE RD		0.126	-0.104	N/A	N/A	N/A
516493.8	5752360	2.196	1.868	RES	12 BEARUP ST		0.126	N/A	N/A	N/A	N/A

516443.2	5752885	2.378	1.551	RES	17 MAIN RD		0.127	-0.098	N/A	N/A	N/A
516369	5752598	2.508	1.96	RES	15 GOVERNMENT RD		0.13	-0.131	N/A	N/A	N/A
516407.2	5753063	2.464	2.195	RES	33 DAVIES ST		0.132	-0.254	N/A	N/A	N/A
516370.7	5752964	2.568	2.104	RES	21 DAVIES ST		0.133	-0.281	N/A	N/A	N/A
516213.4	5752049	2.258	2.092	RES	49 FORESHORE RD		0.138	N/A	N/A	N/A	N/A
516390.3	5753012	2.51	2.081	RES	27 DAVIES ST		0.141	-0.263	N/A	N/A	N/A
517130.7	5752839	1.849	1.546	RES	35 SHORELINE DR		0.146	N/A	N/A	N/A	N/A
516383.6	5752423	2.338	1.808	RES	21 IRVING ST		0.153	-0.424	N/A	N/A	N/A
516495	5753224	2.351	2.106	RES	22 ELLEN AVE		0.157	N/A	N/A	N/A	N/A
516508.6	5752376	2.153	1.802	RES	10 BEARUP ST		0.158	N/A	N/A	N/A	N/A
516471.6	5752441	2.226	1.816	RES	10 BUCKLEY ST	STOOP	0.16	N/A	N/A	N/A	N/A
516371.9	5752953	2.537	2.081	RES	19 DAVIES ST		0.162	-0.239	N/A	N/A	N/A
516931.3	5752656	2.011	1.461	RES	11 SHORELINE DR		0.165	N/A	N/A	N/A	N/A
516445.4	5752488	2.323	1.997	RES	11 IRVING ST		0.17	N/A	N/A	N/A	N/A
516672	5753023	1.89	1.523	RES	16 NEWTON ST		0.17	-0.064	N/A	N/A	N/A
516424.3	5752820	2.38	2.042	RES	9 MAIN RD		0.173	N/A	N/A	N/A	N/A
516406.5	5752668	2.452	2.112	RES	5 GOVERNMENT RD		0.173	-0.082	N/A	N/A	N/A
516411.4	5752681	2.44	2.104	RES	3 GOVERNMENT RD		0.177	-0.072	N/A	N/A	N/A
516488	5752457	2.174	1.797	RES	8 BUCKLEY ST	STOOP	0.187	N/A	N/A	N/A	N/A
516434.9	5752477	2.308	2.114	RES	13 IRVING ST		0.187	N/A	N/A	N/A	N/A
516458.2	5753117	2.339	2.06	RES	8 ELLEN AVE		0.192	-0.226	N/A	N/A	N/A

516389.3	5752918	2.488	2.09	RES	16 DAVIES ST		0.192	-0.173	N/A	N/A	N/A
517062.1	5752769	1.847	1.369	RES	25 SHORELINE DR		0.193	N/A	N/A	N/A	N/A
516333.9	5752549	2.446	1.876	RES	1 ROWLEY ST		0.196	-0.067	N/A	N/A	N/A
516367.3	5752865	2.522	2.11	RES	8 DAVIES ST		0.2	-0.169	N/A	N/A	N/A
516392.9	5753031	2.444	2.049	RES	29 DAVIES ST		0.202	-0.21	N/A	N/A	N/A
517114.2	5752814	1.806	1.335	RES	31 SHORELINE DR		0.206	N/A	N/A	N/A	N/A
516470.8	5752403	2.16	1.801	RES	11 BUCKLEY ST	STOOP	0.207	N/A	N/A	N/A	N/A
516332.2	5752189	2.188	1.813	RES	36 BEARUP ST		0.212	N/A	N/A	N/A	N/A
516362.1	5752931	2.515	2.179	RES	17 DAVIES ST		0.212	-0.174	N/A	N/A	N/A
517078	5752783	1.815	1.434	RES	27 SHORELINE DR		0.214	N/A	N/A	N/A	N/A
516384.2	5752900	2.478	2.107	RES	14 DAVIES ST		0.214	-0.149	N/A	N/A	N/A
516407.4	5752448	2.276	1.864	RES	17 IRVING ST		0.218	-0.362	N/A	N/A	N/A
517129.5	5752826	1.78	1.547	RES	33 SHORELINE DR		0.219	N/A	N/A	N/A	N/A
516529.5	5752467	2.083	1.483	RES	3 BEARUP ST	STOOP	0.22	N/A	N/A	N/A	N/A
516473.7	5753152	2.3	2.179	RES	12 ELLEN AVE		0.221	N/A	N/A	N/A	N/A
516435.1	5753041	2.306	2.006	RES	32 DAVIES ST		0.224	-0.117	N/A	N/A	N/A
516460.1	5752428	2.174	1.87	RES	12 BUCKLEY ST	STOOP	0.224	N/A	N/A	N/A	N/A
516465.8	5752510	2.257	1.977	RES	7 IRVING ST		0.226	N/A	N/A	N/A	N/A
516401.4	5752653	2.4	1.982	RES	7 GOVERNMENT RD		0.226	-0.029	N/A	N/A	N/A
516591.7	5752876	1.908	1.472	RES	9 NEWTON ST		0.231	-0.076	-0.446	-0.446	-0.446
516574.6	5752953	1.859	1.533	RES	4 CENTRE RD		0.233	-0.03	N/A	N/A	N/A

516455.9	5752499	2.253	2.114	RES	9 IRVING ST		0.236	N/A	N/A	N/A	N/A
516480.6	5752981	2.114	1.717	RES	29 MAIN RD		0.237	0.057	N/A	N/A	N/A
516477.2	5753005	2.157	1.798	RES	31 MAIN RD		0.239	0.007	N/A	N/A	N/A
516944.4	5752951	1.763	1.166	RES	8 CATTON ST		0.242	0.067	N/A	N/A	N/A
516298.3	5752157	2.155	1.984	RES	40 BEARUP ST		0.244	N/A	N/A	N/A	N/A
516455.4	5753111	2.289	2.141	RES	6 ELLEN AVE		0.244	-0.149	N/A	N/A	N/A
516647.3	5752970	1.832	1.324	RES	9 CENTRE RD		0.246	-0.003	N/A	N/A	N/A
517092.6	5752798	1.771	1.408	RES	29 SHORELINE DR		0.247	N/A	N/A	N/A	N/A
516501.5	5753246	2.24	1.953	RES	24 ELLEN AVE		0.249	-0.187	N/A	N/A	N/A
516483.2	5752276	2.071	1.743	RES	19 FORESHORE RD		0.249	N/A	N/A	N/A	N/A
516533.6	5752323	2.051	1.619	RES	13 FORESHORE RD		0.25	N/A	N/A	N/A	N/A
516467.9	5753126	2.26	2.002	RES	10 ELLEN AVE		0.25	-0.156	N/A	N/A	N/A
516509.9	5753214	2.179	2.095	RES	22 ELLEN AVE	GRANNY FLAT	0.254	N/A	N/A	N/A	N/A
516523.8	5753149	1.982	1.811	RES	47 MAIN RD		0.256	-0.104	N/A	N/A	N/A
516736.1	5752931	1.82	1.384	RES	15 CENTRE RD		0.256	0.01	N/A	N/A	N/A
516568.5	5753272	1.931	1.697	RES	63 MAIN RD		0.258	-0.023	N/A	N/A	N/A
516481.3	5752853	2.102	1.87	RES	14 MAIN RD		0.26	N/A	N/A	N/A	N/A
516187.7	5752149	2.14	1.796	RES	50 BUCKLEY ST		0.261	N/A	N/A	N/A	N/A
516587.6	5752866	1.882	1.496	RES	7 NEWTON ST		0.269	-0.05	N/A	N/A	N/A
516368.6	5752672	2.416	2.138	RES	8 GOVERNMENT RD		0.271	-0.034	N/A	N/A	N/A
516333	5752848	2.492	2.262	RES	7 DAVIES ST		0.272	-0.116	N/A	N/A	N/A

516354.7	5752605	2.386	1.904	RES	17 GOVERNMENT RD		0.277	-0.006	N/A	N/A	N/A
516330.4	5752299	2.126	1.613	RES	30 BUCKLEY ST	STOOP	0.279	N/A	N/A	N/A	N/A
516508.2	5752299	2.028	1.733	RES	17 FORESHORE RD		0.283	N/A	N/A	N/A	N/A
516922.3	5752935	1.728	1.321	RES	6 CATTON ST		0.286	0.102	N/A	N/A	N/A
516261.9	5752228	2.111	1.752	RES	40 BUCKLEY ST	STOOP	0.291	N/A	N/A	N/A	N/A
516213	5752176	2.109	1.737	RES	46 BUCKLEY ST		0.292	N/A	N/A	N/A	N/A
516275	5752241	2.11	1.803	RES	38 BUCKLEY ST	STOOP	0.292	N/A	N/A	N/A	N/A
516602.2	5752941	1.788	1.513	RES	6 CENTRE RD		0.297	0.041	N/A	N/A	N/A
517311.4	5753003	1.635	1.522	RES	55 SHORELINE DR		0.298	N/A	N/A	N/A	N/A
516412.7	5752992	2.329	2.123	RES	24 DAVIES ST		0.299	-0.071	N/A	N/A	N/A
516493.9	5752852	2.03	1.797	RES	14 MAIN RD	GRANNY FLAT	0.3	N/A	N/A	N/A	N/A
516471.9	5752960	2.082	1.786	RES	27 MAIN RD		0.313	0.118	N/A	N/A	N/A
516382.7	5752346	2.087	1.697	RES	22 BUCKLEY ST	STOOP	0.318	N/A	N/A	N/A	N/A
516412.4	5752775	2.267	2.15	RES	3 MAIN RD		0.318	0.115	-0.123	-0.123	-0.123
516188.4	5752102	2.078	1.826	RES	3 TROOD ST		0.322	N/A	N/A	N/A	N/A
516935.7	5752669	1.846	1.487	RES	13 SHORELINE DR		0.326	N/A	N/A	N/A	N/A
516394	5752367	2.077	1.914	RES	20 BUCKLEY ST	STOOP	0.339	N/A	N/A	N/A	N/A
516607.1	5752834	1.815	1.515	RES	6 NEWTON ST	STOOP	0.343	0.019	N/A	N/A	N/A
517158.1	5752855	1.628	1.738	RES	37 SHORELINE DR		0.353	N/A	N/A	N/A	N/A
516318.6	5752175	2.043	2.006	RES	38 BEARUP ST		0.355	N/A	N/A	N/A	N/A
516469.7	5752335	1.961	1.753	RES	16 BEARUP ST		0.369	N/A	N/A	N/A	N/A

516419.3	5752808	2.177	2.145	RES	7 MAIN RD		0.385	0.205	N/A	N/A	N/A
516396.5	5752640	2.248	1.836	RES	9 GOVERNMENT RD		0.387	0.125	N/A	N/A	N/A
516234	5752621	2.436	2.349	RES	31-33 GOVERNMENT RD	GRANNY FLAT	0.389	0.142	N/A	N/A	N/A
516703.2	5752839	1.712	1.351	RES	17 HANSEN ST		0.401	0.124	N/A	N/A	N/A
516915.6	5752916	1.623	1.221	RES	4 CATTON ST		0.402	0.207	N/A	N/A	N/A
516359.5	5752908	2.33	2.175	RES	13 DAVIES ST		0.402	0.02	N/A	N/A	N/A
516368.3	5753018	2.316	2.068	RES	25 DAVIES ST	SECOND DWELLING	0.404	-0.058	N/A	N/A	N/A
516439.1	5752864	2.101	1.73	RES	13-15 MAIN RD		0.411	0.185	N/A	N/A	N/A
516492.8	5752436	1.944	1.922	RES	7 BUCKLEY ST		0.411	N/A	N/A	N/A	N/A
516464.6	5752953	2.015	1.684	RES	25 MAIN RD		0.415	0.199	N/A	N/A	N/A
516404.4	5752440	2.067	1.926	RES	19 IRVING ST		0.423	-0.153	N/A	N/A	N/A
516695.6	5752829	1.689	1.311	RES	15 HANSEN ST		0.431	0.148	N/A	N/A	N/A
516385.8	5752622	2.22	1.685	RES	11 GOVERNMENT RD		0.433	0.157	N/A	N/A	N/A
516910.2	5752622	1.756	1.4	RES	7 SHORELINE DR		0.433	N/A	N/A	N/A	N/A
516533	5752478	1.868	1.615	RES	3 BEARUP ST		0.433	-0.123	-0.123	-0.123	-0.123
516414.3	5752696	2.188	2.104	RES	1 GOVERNMENT RD		0.438	0.182	N/A	N/A	N/A
516494.9	5753190	2.026	1.917	RES	18 ELLEN AVE		0.44	0.024	N/A	N/A	N/A
516504.3	5753285	2.024	1.993	RES	28 ELLEN AVE		0.459	0.046	N/A	N/A	N/A
516777.3	5752873	1.625	1.386	RES	18 CENTRE RD	SECOND DWELLING	0.46	0.207	N/A	N/A	N/A
516317.6	5752284	1.923	1.624	RES	32 BUCKLEY ST	STOOP	0.478	N/A	N/A	N/A	N/A

516570.6	5753238	1.65	1.69	RES	59 MAIN RD		0.496	0.257	N/A	N/A	N/A
516329.1	5752845	2.255	2.27	RES	5 DAVIES ST		0.519	0.134	N/A	N/A	N/A
516511.1	5752447	1.807	1.745	RES	5 BUCKLEY ST		0.522	N/A	N/A	N/A	N/A
516646.3	5752881	1.579	1.323	RES	12 NEWTON ST		0.528	0.252	N/A	N/A	N/A
516499.9	5752850	1.774	1.775	RES	14 MAIN RD	GRANNY FLAT	0.539	N/A	N/A	N/A	N/A
516341.8	5752303	1.864	1.719	RES	28 BUCKLEY ST	STOOP	0.54	-0.15	-0.15	-0.15	-0.15
516885.9	5752870	1.523	1.31	RES	25 CENTRE RD		0.541	0.309	N/A	N/A	N/A
516488.5	5752868	1.801	1.89	RES	16 MAIN RD	STOOP	0.554	N/A	N/A	N/A	N/A
516351.7	5752323	1.834	1.7	RES	26 BUCKLEY ST	STOOP	0.571	N/A	N/A	N/A	N/A
516659.5	5753000	1.496	1.379	RES	14 NEWTON ST		0.575	0.332	N/A	N/A	N/A
516395.6	5752936	2.085	2.059	RES	18 DAVIES ST		0.576	0.199	N/A	N/A	N/A
516429.8	5752839	1.947	1.758	RES	11 MAIN RD		0.582	0.343	N/A	N/A	N/A
516385.2	5752608	2.009	1.73	RES	13 GOVERNMENT RD		0.617	0.365	N/A	N/A	N/A
516445.7	5752909	1.873	1.71	RES	19 MAIN RD		0.631	0.4	N/A	N/A	N/A
516676	5752828	1.481	1.414	RES	15 HANSEN ST	GRANNY FLAT	0.647	0.356	N/A	N/A	N/A
516454.3	5752937	1.813	1.87	RES	23 MAIN RD	STOOP	0.649	0.418	N/A	N/A	N/A
516758.9	5752891	1.349	1.328	RES	16 CENTRE RD		0.73	0.482	N/A	N/A	N/A
516869.7	5752608	1.406	1.335	RES	3/5 SHORELINE DR	BOTTOM STOREY (STORAGE/GARAGE)	0.789	0.016	N/A	N/A	N/A
516698.2	5752604	2.789	2.549	COM	1 FUTCHER RD	CARAVAN PARK	-0.56	N/A	N/A	N/A	N/A
516582.2	5752493	2.804	1.959	COM	1 FUTCHER RD	CARAVAN PARK RECEPTION	-0.541	N/A	N/A	N/A	N/A

516638.3	5752631	2.571	2.136	COM	1 FUTCHER RD	CARAVAN PARK	-0.336	-0.827	-0.833	N/A	N/A
516753.1	5752484	2.501	1.875	COM	1 FUTCHER RD	CARAVAN PARK	-0.269	N/A	N/A	N/A	N/A
516813.4	5752543	2.365	1.838	COM	1 FUTCHER RD	CARAVAN PARK	-0.143	N/A	N/A	N/A	N/A
516499.4	5752580	2.505	1.872	COM	1 IRVING ST	BUILDING BEHIND CFA	-0.029	-0.591	N/A	N/A	N/A
516648.1	5752646	2.254	1.969	COM	1 FUTCHER RD	CARAVAN PARK	-0.02	N/A	N/A	N/A	N/A
516598.6	5752466	2.281	1.793	COM	1 FUTCHER RD	CARAVAN PARK	-0.018	N/A	N/A	N/A	N/A
516802.6	5752558	2.213	1.816	COM	1 FUTCHER RD	CARAVAN PARK	0.007	N/A	N/A	N/A	N/A
516767	5752538	2.218	2.005	COM	1 FUTCHER RD	CARAVAN PARK	0.01	N/A	N/A	N/A	N/A
516765.5	5752633	2.19	1.901	COM	1 FUTCHER RD	CARAVAN PARK	0.021	N/A	N/A	N/A	N/A
516770.3	5752629	2.122	1.895	COM	1 FUTCHER RD	CARAVAN PARK	0.091	N/A	N/A	N/A	N/A
516805.6	5752535	2.111	1.89	COM	1 FUTCHER RD	CARAVAN PARK	0.112	N/A	N/A	N/A	N/A
516590.9	5752523	2.055	1.939	COM	18 FUTCHER RD	TENNIS CLUB	0.198	N/A	N/A	N/A	N/A
516777.4	5752620	2.014	1.841	COM	1 FUTCHER RD	CARAVAN PARK	0.199	N/A	N/A	N/A	N/A
516832.8	5752563	2.005	1.716	COM	1 FUTCHER RD	CARAVAN PARK	0.21	N/A	N/A	N/A	N/A
516827	5752570	1.998	1.711	COM	1 FUTCHER RD	CARAVAN PARK	0.219	N/A	N/A	N/A	N/A
516788.2	5752663	1.975	1.508	COM	1 FUTCHER RD	CARAVAN PARK	0.229	-0.553	N/A	N/A	N/A
516784	5752580	1.982	1.813	COM	1 FUTCHER RD	CARAVAN PARK	0.237	N/A	N/A	N/A	N/A
516343.5	5752148	2.109	2.033	COM	37 FORESHORE RD	MILK BAR	0.281	N/A	N/A	N/A	N/A
516511.1	5752553	2.095	2.076	COM	1 IRVING ST	CFA BUILDING	0.336	N/A	N/A	N/A	N/A
516728.7	5752942	1.652	1.331	COM	15 CENTRE RD	STUDIO	0.419	0.177	N/A	N/A	N/A