PITTWATER COUNCIL

SUBJECT: Scotland Island Road Reserve and Stormwater Drainage Strategies

Meeting: Planning an Integrated Built Environment **Date:** 18 July 2011

STRATEGY: Transport & Traffic

ACTION: Provide planning, design and management of traffic and transport facilities

PURPOSE OF REPORT

To adopt the Scotland Island Roads and Drainage Masterplans.

The Masterplans consist of a set of three (3) documents as follows:

1. Draft Scotland Island Stormwater Management Strategy
2. Draft Scotland Island Road Reserve Management Strategy
3. Road Reserve and Stormwater Management Implementation Plan

1.0 BACKGROUND

1.1 Council has been working in co-operation with the Scotland Island Residents Association (SIRA) to prepare the drafts of both a Scotland Island Roads Masterplan and a Scotland Island Drainage Masterplan.

1.2 It was necessary to prepare both masterplans at the same time as the provision and future maintenance of a road system on the Island is dependent on the drainage system being upgraded in conjunction with road works.

1.3 The masterplans were developed with reference to all the available environmental and infrastructure reports (many prepared by SIRA) relating to Scotland Island and to the Scotland Island Bushfire Management Plan.

1.4 An "umbrella" document, the draft Road Reserve and Stormwater Management Implementation Plan has also been prepared which extracts all works items related to existing road reserves from both masterplans and presents them in a schedule of works to be provided in priority order over future years as funding becomes available.

1.5 All works not included in the Roads and Stormwater Implementation Plan will be provided over future years via other Council improvement programs and be included in prioritised schedules related to those programs.

1.6 Once all three draft documents are finalised and adopted by Council they can also be used to support any future grants funding applications by either SIRA or Council and other funding initiatives.

1.7 This report presents the final drafts of all three documents including amendments resulting from resident submissions received during the public exhibition period (four (4) months) that ended in May 2011.

2.0 ISSUES

2.1 Assessment of Consultation Responses

- Public consultation was undertaken for a period of four (4) months from January to May 2011 with notification letters sent to all property owners on Scotland Island, advertisements in local media, documentation on display at Council's offices/web page and a public meeting held on Scotland Island on 3 April 3011 (39 residents signed attendance sheet).

- Council received 19 written submissions (including SIRA and the Scotland Island Rural Fire Service), three (3) petitions (81 signatures) and numerous telephone calls.

- A summary of the written submissions received and proposed action/response is attached (prepared by Consultant - refer **Attachment 1**).

- The proposed actions have now been incorporated in the relevant draft Masterplans and draft implementation plan being presented to Council.

- The principal amendments are:

    (i) retain unused section of Thompson Street south of Catherine Park as road reserve;

    (ii) provide wider carriageway/passing bays and turning areas;

    (iii) include safety as consideration in priority weighting system; and

    (iv) consider effectiveness of existing major drainage infrastructure in assessing if upgrade works needed immediately or can be deferred.

2.2 Draft Scotland Island Stormwater Management Strategy

- The draft Scotland Island Stormwater Management Strategy will be tabled at the meeting. This is a lengthy, detailed document setting out stormwater management priorities.

- The document has been prepared in consultation with SIRA and with reference to all relevant investigations/studies undertaken in recent years in respect to the Scotland Island environment/infrastructure.

- The strategy defines the various stormwater drainage catchments on the Island and identified the works items (maintenance and improvement) necessary to ensure that all catchment drainage systems, including watercourses, pipelines, road table drains, etc, can, over time, be brought to an acceptable standard in an environmentally sensitive manner. Also taken into account are the special access difficulties associated with the Island that significantly increase the cost of works and limits how and what types of works can be provided.

- Those works items identified are prioritised on the basis of need in the short, medium or long term. These priorities would be referred to when items are considered for possible inclusion in a future Council improvement or maintenance budget on a priority basis with all other similar outstanding works in Pittwater.

2.3 **Draft Scotland Island Road Reserve Management Strategy**

- The draft Scotland Island Road Reserve Maintenance Strategy will be tabled at the meeting. This is a lengthy, detailed document setting out road management priorities.

- The document has been prepared in consultation with SIRA and with reference to all relevant investigations/studies undertaken in recent years in respect to the Scotland Island environment/infrastructure.

- The strategy defines what the ultimate future system of trafficable road carriageways on the Island would be based around the existing system of roads. Note that it is not possible nor required for vehicular access to be provided to all properties.

- The strategy also identified:

    - informal vehicular access tracks across public reserves that need to be either relocated or formalised through process managed by Council's Reserves, Recreation & Building Services Business Unit;

    - fire trails that need to be provided/upgraded by the Rural Fire Service;
    - that the road system is primarily for pedestrian access and refers to further resident consultation as to how vehicles/traffic will be managed (eg shared zones, road closures, parking restrictions);

    - pedestrian access network outside of road reserves.

- The works items identified are prioritised on the basis of need in the short, medium or long term. These priorities would be referred to when items are considered for possible inclusion in a future Council improvement or maintenance budget. Also taken into account are the special access difficulties associated with the island that significantly increase the cost of works and limits how and what types of works can be provided.

2.4 **Road Reserve and Stormwater Management Implementation Plan**

- The draft Road Reserve and Stormwater Management Implementation Plan has been provided under separate cover and tabled at the meeting. Appended to this report is the proposed prioritised work schedule (by sector) (refer **Attachment 2**) and plan of the sectors included in the Implementation Plan (refer **Attachment 3)**

- The purpose of the Implementation Plan is to schedule all the stormwater drainage improvement works and road pavement improvement works in existing road reserves that are identified in the two strategy plans in priority order so that they can be considered for inclusion in future Council capital works programs as funds become available.

- To facilitate a cost effective, practical approach to the construction of infrastructure on Scotland Island, it is necessary to divide the Implementation Plan into the following two sections:

    (i) Implementation Phase: This identifies projects to be undertaken in the first few years to allow both the provision of high priority/benefit small scale projects across the Island, as well as the provision of an upgraded access for large vehicles, without which most of the large scale works cannot be effected. This period also allows Council to undertake survey, design and consultation in respect to the projects proposed in the following construction phase of the Implementation Plan.

(ii) Construction Phase – by Sectors: due to funding constraints, it is necessary to undertake larger projects in stages and for construction efficiency to complete all works in a section of rod before progressing. For these reasons, the Island has been divided into 14 construction sectors with Sector 1 located at the Cargo wharf access point for service vehicles. It is proposed that work will then be undertaken in accordance with the Sector Number so as to work towards constructing the lower ring road as soon as possible. In recognition of the other issues existing around the Island, it is also proposed that a small allocation of each year's annual funding be allocated to undertake a minor project outside the sector being constructed.

- For all projects in the Implementation Plan, consultation will be undertaken with both SIRA and the directly affected property owners during the design process so that local issues/concerns can be considered.

- The priority recognises the need for improved drainage to be provided before most roadworks and that all works be provided working up from the bottom of the drainage catchments.

- Note that it is not currently possible for large items of construction equipment to gain access to the Island and as such, many of the large improvement items listed cannot be undertaken until such time as a new large vehicle access ramp is provided on the island, probably adjacent to the Cargo wharf.

2.5 **Other Works Implementation Plans**

- Improvement works items identified in the two strategy plans that are not included in the Road Reserve and Stormwater Management Implementation Plan can be included in planning strategies on a progressive basis.

- Future implementation plans may be:
    - Works within Reserves (subject to Plans of Management) and on Foreshores (Pittwater Estuary Management Plan)
    - Fire trails (maintenance and construction) (Rural Fire Service implementation)
    - Street furniture/lighting
    - Traffic Management (load limits, etc)
    - Property Matters including potential for surplus road reserve land to be either sold to fund works or be reclassified as public reserve.

2.6 **Project Approval Process**

- Road infrastructure and drainage projects may be approved by Council (subject to any required approvals by government agencies).

- Parking and related traffic restrictions for which Council has delegated authority from the RTA may be approved by Council following consideration by the Traffic Committee.

- Restrictions on traffic movement (eg closure of road for all but authorised vehicles, creation of 10kph shared zones) may only be approved by the RTA upon application by Council in accordance with RTA guidelines.

- Reclassification of public roads (for sale or creation of reserves) may be approved by Council in accordance with procedures defined in the *Roads Act*.

- All infrastructure provided on reserves may be approved by Council in accordance with the adopted Plans of Management for the reserve.

2.7 **Implementation of Works Items**

- Maintenance works identified in the strategies are to be provided as funding permits over time by Council or Rural Fire Service as part of their normal maintenance programs.

- Improvement works would be considered on a priority basis and be provided over time as funding permits by Council or the Rural Fire Service. Note that Council has committed to funding an annual program of improvement works on Scotland Island as part of the recently approved rate variation.

- The strategy documents are to be used by Council and SIRA as evidence to support applications for grant funding from sources external to Council. Note that Council will probably be required to contribute funds to any grant application that is successful.

- Opportunities for sale of surplus road reserve land to fund infrastructure improvements will also need to be considered.

3.0 SUSTAINABILITY ASSESSMENT

3.1 Supporting & Connecting our Community (Social)

3.1.1 The Road Reserve and Stormwater Management Strategies provide the basis for improving the standard of pedestrian and vehicular access on the Island so that all residents (especially the less able) have enhanced access to all services and the wider community.

3.1.2 There has been a strong community desire for the preparation of these documents by Council

3.2 Valuing & Caring for our Natural Environment (Environmental)

3.2.1 The Road Reserve Strategy is based on encouraging pedestrian traffic at the expense of vehicular traffic to alleviate the adverse environmental impacts now occurring and to improve the health/safety of the residents.

3.2.2 The Stormwater Drainage Strategy is based on the environmentally sympathetic treatment of both roads and watercourses with the aim of reducing siltation and improving the condition of watercourses/natural bushland.

3.3 Enhancing our Working & Learning (Economic)

3.3.1 The improved environment and transportation system that would eventually exist on the Island would enhance access and communication between residents.

3.4 Leading an Effective & Collaborative Council (Governance)

3.4.1 The strategies have been developed in close co-operation with the Scotland Island community. Works items/maintenance of infrastructure will be provided effectively and economically in priority order via Council's normal works and maintenance programs using the various Business Unit Implementation Plans.

3.4.2 The strategies will also be used when seeking grant funding for projects from sources external to Council.

3.5 **Integrating our Built Environment (Infrastructure)**

3.5.1 The strategies provide direction for the provision of roads/paths/drainage on the Island to improve the mobility of residents and so enhance the desirability of the Island as well as rationalising the use of Council land.

4.0 EXECUTIVE SUMMARY

4.1 This report presents to Council the following three draft documents:

- Scotland island Road Reserve Management Strategy
- Scotland Island Stormwater Management Strategy
- Scotland Island Road Reserve and Stormwater Drainage Implementation Plan.

4.2 The two strategy documents have been prepared in close co-operation with SIRA with the aim of providing a vision and direction for the future provision of road/pedestrian and stormwater infrastructure on Scotland Island.

4.3 The Road Reserve and Stormwater Management Implementation Plan is a prioritised schedule of works identified in the strategy documents that cover works on existing road reserves and stormwater works and are the responsibility of the Council's Urban Infrastructure Business Unit to provide over time. Note that Council has committed to funding an annual program of works and that the document is to be reviewed regularly (nominally every five (5) years) as projects are completed.

4.4 Projects identified in the masterplans but not included in the Implementation Plan are to be included in separate schedules of works for consideration in other Council improvement programs.

RECOMMENDATION

That the following three documents (as tabled at the meeting):

- Scotland Island Road Reserve Management Strategy
- Scotland Island Stormwater Management Strategy
- Scotland Island Road Reserve and Stormwater Management Implementation Plan.

be adopted and used as the reference documents for the provision of future improvement works on Scotland Island.

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Scotland Island Road Reserve and Stormwater Management Strategies (Implementation Plan)

Summary of Public Comments Received and Proposed Action

Summary of Comment	Proposed Action
Concerns regards proposed stormwater drain between 13/15 Florence Terrace (ie 1m wide drainage easement shown on Figure S5). Concerns that dwellings, rainwater tanks, trees will not allow construction of a drainage line at this location.	Currently sag at bend in Florence Terrace at this location -need to drain. Other options include new route thru private property or new line down to Pitt View. Rec. modifying measure to be more generic (ie a broad drainage solution). Amend measure description in report.
Comments as follows: 1. Need action now. 2. UI Implementation plan does not cover maintenance and traffic man. 3. suggest bond for construct equip/large vehicles that cause damage to roads. 4. priority ranking method too simple-ignores pedestrian safety. 5. work with SIRA to assign ranking. 6. Supports #96, should be costed and implemented immediately. 7. Supports #97 should be costed and implemented immediately.8. Supports #11 would have immediate effect on water quality. 9. #46 ok if installed properly -should be highest priority.	1. noted. 2. not role of current plan but will be addressed by other in future. 3. Part of future traffic man plan by others. 4. will reassess ranking to incorporate ped safety. 5. agreed, but need a starting point. 6. will add cost. 7. will add cost. 8. noted. 9.noted. Amend costings in report.
Concerns regards UI Impl Recs H2, S8, H8 and H9. 1.H2 Return Thompson Street south of Catherine Park to public reserve and have permanent driveway access to Lots 338,339,340 and 341. 2.H9 no public road needed across back of ex lots. 3. S8 no vehicular barrier at Thompson Street ch 1460. 4. Request maintenance or road upgrade by Council of Thompson street at this location	1. Agree return unused section of Thompson street to public reserve (as always). Cease public road at ch1460 then private driveways after that. 2. agree remove public road H9 -already removed from Sept 09 RRS (but not part of current UI Impl plan). 3. Agreed -push closure further up hill past residence access. 4. Will occur in public section in future but not for private driveways. Amend description of measure in report.
As above -identical letter	As above
Simplified ranking system. Ranking does not account for ped. Safety. No traffic man. Recs. #97 should be 1st ranked. Who decides what gets done. SIRA can help with hot spot id.	Reassess ranking system to account for ped safety. Traffic man by others. Will review all ranking and prioritise engineering related measures. Ultimately Council will decide what measures are implemented with the assistance of others such as SIRA built Council will have final say. Amend words in report to confirm this.
Town water on island long overdue. Hope sewer system will stem flow from existing septics. Why is major road reconstruction and upgrading a priority for only 20 reg vehicles on Island? Vehicular ferry now required?	Road recon/upgrade primarily needed to stabilise surface for pedestrians and to improve water quality. No plan to encourage more vehicles by providing reg vehicular ferry.
Need to balance necessary works with preservation of the existing environment, ecology and ambiance. Long term roads and drainage on Island are supported. In short term funds should be directed to Church Point. Oppose any demolition of existing stone channel on property (25 Robertson) as existing channel functions well and demolition would damage nearby trees.	Easement and channel currently proposed. If current channel satisfactory then only easement would be applied. Amend measure words accordingly

Summary of Comment	Proposed Action
Petition to Council (63 signatures) requesting following 1. Keep Thompson Street (South of Catherine Park) as a road reserve and keep the current access to the road system for lots 338 to 343. 2. Not build a new road from Kevin Ave and thereby preserve 112 Thompson St. 3. Instead to repair and maintain the existing road infrastructure including Thompson Street from Ch1460 to 1500.	See response to point 3 above (same issues).
Same as point 8,3 and 4	Same as point 8,3 and 4
Same as point 8,3 and 4	Same as point 8,3 and 4
Closure of Hilda Ave to traffic. Questions whether the closure will impact on ability to build a home (ie restrict truck access)	Access will still be available from Thompson Street.
Opposes closure of Thompson to vehicular traffic at Ch 1460 as it will restrict access to lots 344 and 345	Move closure further up hill past access points to lots 344 and 345 -private driveway to get access -not public road. Residents responsible for construction and maintenance of driveways.
Supports issues. Wants to retain access from the reserve component of Thompson. Concerned about easement/drain proposed over Lot 339 Thompson Street.	For response to issues see Point 3. Easement will be required to protect drain. Drain proposed over existing water course.
Report on road conditions and access availability -RFS perspective.	Highlighted areas of concern noted. All highlighted areas are currently included in the road reserve and/or stormwater management strategies as requiring works. Recommendations noted and to be considered in formulation of UI implementation plan priorities.
1. SIRFB encourages improvement to road infrastructure on the island. In the past many roads have had to be closed by SIRFB because they were unsafe. 2. SIRFB does not support closure of Elsie to vehicles. 3. SIRFB does not support closure of any roads (incl those in Thompson St who do not currently have any road access).4. Ex roads too narrow, no turning areas and passing bays. 5 Rough road is a problem for patients during medical evacuation.	1. Noted. 2. Closure to remain as it does not provide a link to another public road reserve. 3. Closures to remain -same resp 2. 4. noted and pr works improve on ex. To provide wider carriageway, passing bays and turning areas 5. Noted and proposed works improve on ex to provide better ride comfort.
1. Supports starting works for drainage and road pavements in lower areas of Island first. 2. Supports permanent hard surface for all island roads. 3. Does not support resin based road surface treatment. 4. Suggests parking provisions be made in the plans. 5. Suggests drainage and pedestrian safety should be a priority.	1. Noted. 2. noted. 3. noted. 4. parking will be restricted. Is dealt with in road reserve strategy. 5. noted.
Response to all three SI reports. 1. PRINCIPLES SUPPORTED -a. well designed drainage as first measure, partic. rock channels and waterbars. b. need for maintenance plan. c. shareway TMP. d. pr road width ok. e. need for natural heritage inventory. F. use of soft engineering design where appropriate. g. conversion of unused public roads to park reserve. 2 CONCERNS a. Need TMP. b. WP response to previous comments from SIRA Drainage Project team. c. Road reserve maintenance left out of UI implementation plan. d. Remove seal all roads. e. ranking system too simplistic. f. SIRA say in short term measures. g. exclusions from UI plan. h. Do not support closure of Thompson for Lots 344 and 345. i. Ramp at Cargo Wharf -should be part of TMP. 3. PRIORITIES a. eng design. b. tmp. c. waterbars. d. drainage. e. liaison with SIRA. f. various rigid pavements on steep roads.	1. Noted. 2. a. TMP by others. B.WP will review previous SIRA comments with Council. C Maintenance by others. D Disagree. Seal vital for WQ and safety. E. review ranking system. F. SIRA will be involved in decision process. Wording to be amended. G. By others. H. Agree will amend. I. by others. 3 a. agree. b. by others. c. agree. d. agree. e. amend wording. f. agree.

Summary of Comment	Proposed Action
Concerns. 1. Need to embrace softer engineering approach. 2. TMP needed first. 3. Not supportive of ramp at Cargo Wharf. 4. Flawed ranking system (number of suggested changes). 5.Supports natural heritage inventory. 6. remove blanket approach in favour of site specific measures. 7. does not agree that all roads should be sealed. 8.failed seals dangerous. 9. supports use of alternative seals. 10. crossfall design site specific. 11. supports use of crossbanks. 12. Supports natural table drains. 13. Recent Council Yamba drainage works not naturalistic. 14. Could concrete be coloured? 15.minimise street furniture. 16. minimise street lighting. 17. does not support closure of Thompson to Lot 344 and 345. 18. Illegal trail shown on WP plans in Elizabeth Park. 19. Investigate firetrail extensions as rec. 20. Use correct drainage in pathway designs. 21. Cycling on Island unrealistic. 22. Supports conversion of unused public roads to park reserves. 23. Questions feasibility of shared service trench arrangement. 24. No sediment storage at Elizabeth Park. 25. No parking at Cargo Wharf. 26. several errors in report.	1. Noted. 2. by others. 3. noted. 4. Will reassess. 5. noted. 6. Strategy document -blanket approach is applicable. Site specific at detailed design stage. 7. disagree. 8. noted. 9. disagree. 10. agree . Captured at detailed design stage. 11. agree in short term. 12. agree. 13. design appropriate for that site and ex constraints/opp. 14. possibly. subject to detailed design. 15. noted. 16. noted but need to consider safety and Councils responsibilities. 17. agree -will change this measure. 18. Will amend plan note. 19. will ensure words in report emphasise further investigation required. 20. agree. 21. noted. 22. noted. 23. noted. will check words/feasibility. 24. noted. will remove. 25. disagree. 26. will investigate and remove confusion/contradiction.
1. Supports connection of island to regional sewer system. 2. supports connection of Island to town water supply. 3. supports sealing all main roads and using conventional road building techniques incorporating appropriate drainage systems as are evident in the neighbouring suburbs of Pittwater	1,2,3 all points noted and already incorporated as recommendations. Will add additional points to report with regard to sewer/town water retic benefits.

Table 2 – UI Implementation Plan

No.	Measure No.	Type	Measure Description	Total Captial Cost Estimate (AU$ 2011)	Construction Sector (1 to 15)	Rank #
ESTABLISHMENT PHASE						
162	F23	L-RSS	Provide new access ramp and associated laydown/pickup area for large construction/maintenance vehicles	$300,000	1	152**
51	DS10-1	S/M-RSS	**Stormwater Grate/Pit Replacement Stage 1** - Existing horizontal roadside stormwater grates to be progressively replaced. General MULTIPLE LOCATIONS	$36,000	1	1
52	DS10-2	S/M-RSS	**Stormwater Grate/Pit Replacement Stage 2** - Existing horizontal roadside stormwater grates to be progressively replaced. General MULTIPLE LOCATIONS	$36,000	1	1
53	DS10-3	S/M-RSS	**Stormwater Grate/Pit Replacement Stage 3** - Existing horizontal roadside stormwater grates to be progressively replaced. GENERAL MULTIPLE LOCATIONS	$36,000	1	1
57	WR4	S/M-RSS	Build-up windrow on Richard Road	$4,500	2	4
83	WR61	S/M-RSS	Re-profile the bend on Richard Road north-west of Hilda Av	$15,000	2	4
66	WR22	S/M-RSS	Stabilise the drains that enter the eastern creek crossing on Richard Rd	$7,500	3	4
SECTOR 1						
107	DL2-1	L-RSS	**Trunk Drainage Sector 1** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	1	4
1	DS1-1	S/M-RSS	Table drain in Richard Road **(Sector 1)**	$51,000	1	22
8	DS4-1	S/M-RSS	**Waterbars/Crossbanks Sector 1** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	1	22
24	DS7-1	S/M-RSS	**Table Drain Crossings Sector 1** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	1	22
122	DL3-1	L-RSS	**5yr ARI Piped Drainage Sector 1** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	1	22
179	SWM7-14	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7- BR58	$29,200	1	22
84	WR62	S/M-RSS	Fix the drainage on Richard Road opposite unnamed (40ft wide) road	$30,000	1	91
171	SWM7-6	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7 - GP16	$187,500	1	91
58	WR7	S/M-RSS	Install temporary timber safety bollards on the two creeks culvert crossings on Richard Road north of the unnamed (40ft wide) road reserve	$4,500	1	131
95	S11	L-RSS	Provide guard rail on steep down slope drop along Richard Road just north of the Unnamed Road	$18,000	1	133
102	S20	L-RSS	Construct road embankment retaining structures on high side of Robertson Road at Fitzpatrick Avenue *(ie above walking track/future road)*	$112,500	1	136
137	P1	L-RSS	Construct rigid pavement *(or equivalent)* on steep section of Robertson Road from intersection with Cargo Wharf Road/Fitzpatrick Ave between approx. chainages 840 and 880 *(refer to Figure R3 for road drainage details)*	$216,000	1	141
153	P15-1	L-RSS	**Richard Pavement Sector 1** - Construct new/rehabilitate existing flexible pavement (ie insitu profiled and stabilised basecourse over two coat flush seal) for full length of Richard Road except at locations of proposed rigid pavement (refer to Measure P9) (3 stages)	$409,500	1	141
91	S1	L-RSS	Construct retaining structures (gabion or similar) on steep road embankments along Richard Road north of the Unnamed Rd.	$337,500	1	161
SECTOR 2						
54	DS12-1	S/M-RSS	**Outlet Stabilisation Stage 1** - Stabilise the stormwater outlets by stabilising the outlet gully	$120,000	2	4
55	DS12-2	S/M-RSS	**Outlet Stabilisation Stage 2** - Stabilise the stormwater outlets by stabilising the outlet gully	$120,000	2	4
56	DS12-3	S/M-RSS	**Outlet Stabilisation Stage 3** - Stabilise the stormwater outlets by stabilising the outlet gully	$120,000	2	4
108	DL2-2	L-RSS	**Trunk Drainage Sector 2** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	2	4
2	DS1-2	S/M-RSS	Table drain in Richard Road **(Sector 2)**	$51,000	2	22
9	DS4-2	S/M-RSS	**Waterbars/Crossbanks Sector 2** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	2	22
25	DS7-2	S/M-RSS	**Table Drain Crossings Sector 2**- Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	2	22

No.	Measure No.	Type	Measure Description	Total Capital Cost Estimate (AU$ 2011)	Construction Sector (1 to 15)	Rank #
123	DL3-2	L-RSS	**5yr ARI Piped Drainage Sector 2**-Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	2	22
165	SW30	S/M-SWMS	Replace the stormwater grates on the Richard Road- Hilda Avenue intersection.	$15,000	2	22
178	SWM7-13	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7- BR37	$39,600	2	22
170	SWM7-5	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7 - GPT5	$187,500	2	68
177	SWM7-12	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7- BR36	$32,400	2	68
169	SWM7-4	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7 - GPT4	$187,500	2	91
164	SW7	S/M-SWMS	Reform drainage on Hilda Avenue	$75,000	2	131
60	WR10	S/M-RSS	Adopt short term solution to the stabilisation of the trafficable area and drainage for Hilda Ave if the road closure has not been completed	$45,000	2	140
154	P13-2	L-RSS	**Richard Pavement Sector 2** - Construct new/rehabilitate existing flexible pavement (*je insitu* profiled and stabilised basecourse over two coat flush seal) for full length of Richard Road except at locations of proposed rigid pavement (refer to Measure P9) (3 stages)	$409,500	2	141
97	S17-1	L-RSS	**Passing Bays Stage 1** - Incorporation of passing bays at regular intervals within the road reserve (all roads)	$90,000	2	162
88	H5, 82 and W10	L-RSS	Convert Hilda Ave to a walking track only (ie no vehicular access) but leave as road reserve (incl drainage and surface stabilisation)	$747,500	2	170
SECTOR 3						
109	DL2-3	L-RSS	**Trunk Drainage Sector 3** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	3	4
3	DS1-3	S/M-RSS	Table drain in Richard Road (**Sector 3**)	$51,000	3	22
10	DS4-3	S/M-RSS	**Waterbars/Crossbanks Sector 3** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	3	22
26	DS7-3	S/M-RSS	**Table Drain Crossings Sector 3** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain.	$37,200	3	22
75	WR45	S/M-RSS	Re-profile Richard Road west of the eastern creek crossing. Or otherwise, remove the concrete drain and form a new rock-lined table drain.	$30,000	3	22
124	DL3-3	L-RSS	**5yr ARI Piped Drainage Sector 3** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	3	22
176	SWM7-11	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7- BR35	$18,000	3	22
23	DS 5,6 and 11	S/M-RSS	Install silt traps as shown in Plan SR023 (includes DS5 and DS 11)	$180,000	3	68
62	WR12	S/M-RSS	Modify the private driveway entries of Richard Road east of the eastern creek crossing to allow flow down a newly reshaped and stabilised table drain. Then, re-profile the road as necessary to regularly direct stormwater runoff into the table drain possibly with use of cross banks	$30,000	3	68
168	SWM7-3	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7 - GPT3	$187,500	3	91
65	WR21	S/M-RSS	Construct suitable stormwater drainage down Cecil St	$75,000	3	118
163	SW6	S/M-SWMS	Temporarily stabilise Cecil Street if it has not been closed to traffic.	$22,500	3	136
145	P9	L-RSS	Construct rigid pavement *(or equivalent)* on steep section of Richard Road between approx. chainages 260 and 320 *(refer to Figure R3 for road chainage details)*	$216,000	3	139
155	P13-3	L-RSS	**Richard Pavement Sector 3** - Construct new/rehabilitate existing flexible pavement (*je insitu* profiled and stabilised basecourse over two coat flush seal) for full length of Richard Road except at locations of proposed rigid pavement (refer to Measure P9) (3 stages)	$409,500	3	141
143	P7	L-RSS	Construct rigid pavement *(or equivalent)* for full length of Cecil Street	$158,000	3	157
SECTOR 4						
67	WR23	S/M-RSS	Replace the stormwater inlet grate on the intersection of Harold Ave and Richard Rd	$3,750	4	4
69	WR33	S/M-RSS	Stabilise the gully erosion downstream of the stormwater outlet on the intersection of Harold Ave and Richard Rd	$45,000	4	68
110	DL2-4	L-RSS	**Trunk Drainage Sector 4** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	4	68
11	DS4-4	S/M-RSS	**Waterbars/Crossbanks Sector 4** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	4	91
27	DS7-4	S/M-RSS	**Table Drain Crossings Sector 4** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain.	$37,200	4	91
39	DS8-1	S/M-RSS	**Table Drains Sector 4** - construct stabilised table drains (not including specific sites mentioned in other short/medium term measures).	$60,000	4	91
167	SWM7-2	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7 - GPT2	$187,500	4	91

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125	DL3-4	L-RSS	**5yr ARI Piped Drainage Sector 4** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	4	111
140	94	L-RSS	Construct rigid pavement *(or equivalent)* on steep section of Thompson Road between approx. chainages 400 and 500 *(refer to Figure R3 for road chainage details)*	$460,000	4	141
96	S14	L-RSS	Provide guard rail on steep down slope drop along Harold Avenue	$27,000	4	152
144	P8	L-RSS	Construct rigid pavement *(or equivalent)* for full length of Harold Ave and round the corner into the start of Richard Road	$432,000	4	162
SECTOR 5						
111	DL2-5	L-RSS	**Trunk Drainage Sector 5** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	5	68
12	DS4-5	S/M-RSS	**Waterbars/Crossbanks Sector 5** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	5	91
28	DS7-5	S/M-RSS	**Table Drain Crossings Sector 5** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	5	91
40	DS8-2	S/M-RSS	**Table Drains Sector 5** - construct stabilised table drains (not including specific sites mentioned in other short/medium term measures)	$60,000	5	91
166	SWM7-1	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7 - (PIT)	$187,500	5	91
126	DL3-5	L-RSS	**5yr ARI Piped Drainage Sector 5** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	5	111
138	P2 and P6	L-RSS	Construct rigid pavement *(or equivalent)* on steep section of Thompson Road from intersection with Kevin Ave between approx. chainages 0 and 35 *(refer to Figure R3 for road chainage details)*	$126,000	5	157
139	P5	L-RSS	Construct rigid pavement *(or equivalent)* on steep section of Thompson Road between approx. chainages 130 and 250 *(refer to Figure R3 for road chainage details)*	$432,000	5	157
98	S17-2	L-RSS	**Passing Bays Stage 2** - Incorporation of passing bays at regular intervals within the road reserve (all roads)	$90,000	5	162
156	P16-1	L-RSS	**Thompson Pavement Sector 5** - Construct new/rehabilitate existing flexible pavement (ie insitu profiled and stabilised basecourse over two coat flush seal) along Thompson Street between chainages 0 and 1140 (refer to Figure R3 for road chainage details) except at locations of proposed rigid pavement (refer to Measures P2 to P6) (3 stages)	$380,875	5	175
SECTOR 6						
112	DL2-6	L-RSS	**Trunk Drainage Sector 6** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	6	22
180	SWM7-15	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7- BRS9	$23,400	6	22
13	DS4-6	S/M-RSS	**Waterbars/Crossbanks Sector 6** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	6	68
29	DS7-6	S/M-RSS	**Table Drain Crossings Sector 6** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	6	68
41	DS8-3	S/M-RSS	**Table Drains Sector 6** - construct stabilised table drains (not including specific sites mentioned in other short/medium term measures)	$60,000	6	68
127	DL3-6	L-RSS	**5yr ARI Piped Drainage Sector 6** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	6	91
99	S17-3	L-RSS	**Passing Bays Stage 3** - Incorporation of passing bays at regular intervals within the road reserve (all roads)	$90,000	6	162
159	P17-1	L-RSS	**Robertson Pavement Sector 6** - Construct new/rehabilitate existing flexible pavement (ie insitu profiled and stabilised basecourse over two coat flush seal) along Robertson Road between chainages 850 and 1340 (refer to Figure R3 for road chainage details) except at locations of proposed rigid pavement (refer to Measure P1) (3 stages)	$354,375	6	162
105	W7	L-RSS	Steps placed along the lower half of the Acona Street walking track to provide all weather access	$10,500	6	175
SECTOR 7						
74	WR13	S/M-RSS	Re profile the intersection of Thompson St and Robertson Rd	$22,500	7	22
113	DL2-7	L-RSS	**Trunk Drainage Sector 7**- Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	7	22
14	DS4-7	S/M-RSS	**Waterbars/Crossbanks Sector 7** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	7	68

No.	Measure No.	Type	Measure Description	Total Captial Cost Estimate (AU$ 2011)	Construction Sector (1 to 15)	Rank #
30	DS7-7	S/M-RSS	**Table Drain Crossings Sector 7** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	7	68
42	DS8-4	S/M-RSS	**Table Drains Sector 7** - construct stabilised table drains ((not including specific sites mentioned in other short/medium term measures)	$60,000	7	68
128	DL3-7	L-RSS	**5yr ARI Piped Drainage Sector 7** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	7	91
63	WR13	S/M-RSS	Construct cross banks and reprofile surface on the steep section of Thompson St west of Robertson Rd if not closed off to traffic	$22,500	7	126
160	P17-2	L-RSS	**Robertson Pavement Sector 7** - Construct new/rehabilitate existing flexible pavement (ie insitu profiled and stabilised basecourse over two coat flush seal) along Robertson Road between chainages 850 and 1340 (refer to Figure R3 for road chainage details) except at locations of proposed rigid pavement (refer to Measure P1) (3 stages)	$354,375	7	162
92	S8	L-RSS	Provide turning area at end of Robertson Road (*ie chainage 1540*) and convert section of Thompson Rd to the east of its intersection with Robertson Road to a stabilised walking track. Provide barriers to prevent unauthorised vehicular access along Thompson Street to the west. Site Barriers up Thompson to ensure access to existing residential properties is maintained.	$150,000	7	170
161	P21	L-RSS	Seal Steep section of Thompson Ch 1340-1540 (Flexible pavement). Convert upper section of Thompson Road to a walking track only (*ie close off to vehicles*). Maintain vehicular access to existing properties. Residents to construct private driveway access from end of Thompson turning head (refer to Measure S8 also)	$315,000	7	180
SECTOR 8						
64	WR20	S/M-RSS	Re-profile the Thompson St - Cecil St intersection	$30,000	8	87
80	WR53	S/M-RSS	Stabilise (rock line) the table drain in Thompson St south of Kevin Av	$15,000	8	91
31	DS7-8	S/M-RSS	**Table Drain Crossings Sector 8** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	8	107
114	DL2-8	L-RSS	**Trunk Drainage Sector 8** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	8	107
77	WR47	S/M-RSS	Construct and stabilise a table drain along Thompson Street between Harold Av and Cecil St. Where necessary, install cross banks.	$52,500	8	111
78	WR48	S/M-RSS	Construct culvert under Thompson Road at creek crossing between Harold Av and Cecil St	$37,500	8	111
15	DS4-8	S/M-RSS	**Waterbars/Crossbanks Sector 8** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	8	118
43	DS8-5	S/M-RSS	**Table Drains Sector 8** - construct stabilised table drains ((not including specific sites mentioned in other short/medium term measures).	$60,000	8	118
129	DL3-8	L-RSS	**5yr ARI Piped Drainage Sector 8** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	8	118
141	P5 and S7	L-RSS	Construct rigid pavement *(or equivalent)*on steep section of Thompson Road between approx. chainages 740 and 830 (*refer to Figure R3 for road chainage details*)	$324,000	8	157
157	P16-2	L-RSS	**Thompson Pavement Sector 8** - Construct new/rehabilitate existing flexible pavement (ie insitu profiled and stabilised basecourse over two coat flush seal) along Thompson Street between chainages 0 and 1140 (refer to Figure R3 for road chainage details) except at locations of proposed rigid pavement (refer to Measures P2 to P6) (3 stages)	$385,875	8	175
SECTOR 9						
61	WR11	S/M-RSS	Re-profile Thompson St & Hilda Ave intersection and direct flow down Thompson St instead of Hilda Ave	$22,500	9	63
81	WR55	S/M-RSS	Direct flow off Thompson St down the unnamed (40ft wide) road reserve	$8,250	9	91
32	DS7-9	S/M-RSS	**Table Drain Crossings Sector 9**- Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	9	107
115	DL2-9	L-RSS	**Trunk Drainage Sector 9** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	9	107
16	DS4-9	S/M-RSS	**Waterbars/Crossbanks Sector 9** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	9	118
44	DS8-6	S/M-RSS	**Table Drains Sector 9** - construct stabilised table drains ((not including specific sites mentioned in other short/medium term measures).	$60,000	9	118
130	DL3-9	L-RSS	**5yr ARI Piped Drainage Sector 9** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	9	118
68	WR30	S/M-RSS	Fix the log sediment trap on the western cutting of the Elizabeth Park track	$4,500	9	126
142	P6 and S3	L-RSS	Construct rigid pavement *(or equivalent)*on steep section of Thompson Road between approx. chainages 940 and 1010 (*refer to Figure R3 for road chainage details*)	$252,000	9	141
103	W1	L-RSS	Realignment of upper Fitzpatrick Avenue above Thompson Street because it is badly eroded and currently runs within private property	$18,000	9	152

No.	Measure No.	Type	Measure Description	Total Captial Cost Estimate (AU$ 2011)	Construction Sector (1 to 15)	Rank #
104	W3	L-RSS	Installation of cross banks on the Fitzpatrick Avenue walking track between Robertson Road and Thompson Street to divert runoff off/away from the track	$6,000	9	152
90	H7-2 and S 15	L-RSS	Provide turning areas(ie hammer head or similar) at the "dead end" on Thompson Street (incl guard rail and retaining structures)	$191,250	9	170
106	W8	L-RSS	Additional steps placed on the Fitzpatrick Avenue walking track between Robertson Road and Thompson Street possible between the existing rock steps	$12,750	9	175
158	P16-3	L-RSS	**Thompson Pavement Sector 9** - Construct new/rehabilitate existing flexible pavement (ie insitu profiled and stabilised basecourse over two coat flush seal) along Thompson Street between chainages 0 and 1140 (refer to Figure R3 for road drainage details) except at locations of proposed rigid pavement (refer to Measures P2 to P6) (3 stages)	$385,875	9	175
SECTOR 10						
17	DS4-10	S/M-RSS	**Waterbars/Crossbanks Sector 10**- Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	10	111
33	DS7-10	S/M-RSS	**Table Drain Crossings Sector 10** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	10	111
116	DL2-10	L-RSS	**Trunk Drainage Sector 10** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	10	111
45	DS8-7	S/M-RSS	**Table Drains Sector 10** - construct stabilised table drains (not including specific sites mentioned in other short/medium term measures).	$60,000	10	126
131	DL3-10	L-RSS	**5yr ARI Piped Drainage Sector 10** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	10	126
147	P12	L-RSS	Construct new/rehabilitate existing flexible pavement (*ie insitu profiled and stabilised basecourse over two coat flush seal*) for full length of Pitt View Street	$236,250	10	141
SECTOR 11						
117	DL2-11	L-RSS	**Trunk Drainage Sector 11** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	11	4
18	DS4-11	S/M-RSS	**Waterbars/Crossbanks Sector 11** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	11	22
34	DS7-11	S/M-RSS	**Table Drain Crossings Sector 11**- Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	11	22
46	DS8-8	S/M-RSS	**Table Drains Sector 11** - construct stabilised table drains (not including specific sites mentioned in other short/medium term measures).	$60,000	11	22
85	WR63	S/M-RSS	Fix the drainage on Florence Terrace east of Pitt View St. Possible remove the concrete table drain and replace with a rock lined drain set lower into the road profile	$67,500	11	68
132	DL3-11	L-RSS	**5yr ARI Piped Drainage Sector 11** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	11	68
172	SWM7-7	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7- BRS1	$36,000	11	68
173	SWM7-8	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7- BRS2	$43,200	11	68
4	DS2-1 (DS2 and WR14)	S/M-RSS	Modify the profile of Florence Terrace **(Sector 11)**	$15,188	11	87
140	P14-1	L-RSS	**Florence Pavement Sector 11**- construct new/rehabilitate existing flexible pavement (ie insitu profiled and stabilised basecourse over two coat flush seal) for full length of Florence Terrace (4 stages)	$354,375	11	141
SECTOR 12						
72	WR41	S/M-RSS	Form a table drain on Florence Terrace immediately south of Pathilda Reserve	$3,750	12	4
76	WR45	S/M-RSS	Formalise a table drain along Florence Terrace north of Pathilda Reserve	$3,750	12	4
118	DL2-12	L-RSS	**Trunk Drainage Sector 12** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of naturalistic rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	12	4
19	DS4-12	S/M-RSS	**Waterbars/Crossbanks Sector 12**- Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	12	22
35	DS7-12	S/M-RSS	**Table Drain Crossings Sector 12** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	12	22
47	DS8-9	S/M-RSS	**Table Drains Sector 12** - construct stabilised table drains (not including specific sites mentioned in other short/medium term measures)	$60,000	12	22
174	SWM7-9	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7- BRS3	$32,400	12	22

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133	DL3-12	L-RSS	**5yr ARI Piped Drainage Sector 12** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	12	68
5	DS2-2 (DS2 and WR14)	S/M-RSS	Modify the profile of Florence Terrace (**Sector 12**)	$15,188	12	87
94	S10	L-RSS	Stabilise road surface (*ie flush seal*) and provide safety signs on sharp bends and steep sections of Florence Terrace	$52,500	12	133
150	P14-2	L-RSS	**Florence Pavement Sector 12 (incl small sect 5)** - construct new/rehabilitate existing flexible pavement (ie insitu profiled and stabilised basecourse over two coat flush seal) for full length of Florence Terrace (4 stages)	$354,375	12	141
100	S17-4	L-RSS	**Passing Bays Stage 4** - Incorporation of passing bays at regular intervals within the road reserve (all roads)	$90,000	12	162
SECTOR 13						
73	WR42	S/M-RSS	Re-profile Florence Terrace between Lawanna St and Elsie St to form infall drainage and form a table drain	$22,500	13	4
119	DL2-13	L-RSS	**Trunk Drainage Sector 13** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of natural/lo/w rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	13	4
20	DS4-13	S/M-RSS	**Waterbars/Crossbanks Sector 13** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	13	22
36	DS7-13	S/M-RSS	**Table Drain Crossings Sector 13** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	13	22
48	DS8-13	S/M-RSS	**Table Drains Sector 13** - construct stabilised table drains (not including specific sites mentioned in other short/medium term measures)	$60,000	13	22
175	SWM7-10	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7- BR34	$28,800	13	22
134	DL3-13	L-RSS	**5yr ARI Piped Drainage Sector 13** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	13	68
6	DS2-3 (DS2 and WR14)	S/M-RSS	Modify the profile of Florence Terrace (**Sector 13**)	$15,188	13	87
93	S9	L-RSS	Provide guard rail on Florence Tce at Pathilda Reserve and in the vicinity of Lawanna Street	$39,000	13	136
151	P14-3	L-RSS	**Florence Pavement Sector 13** - construct new/rehabilitate existing flexible pavement (ie insitu profiled and stabilised basecourse over two coat flush seal) for full length of Florence Terrace (4 stages)	$354,375	13	141
SECTOR 14						
120	DL2-14	L-RSS	**Trunk Drainage Sector 14** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of natural/lo/w rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	14	4
21	DS4-14	S/M-RSS	**Waterbars/Crossbanks Sector 14** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term measures)	$14,400	14	22
37	DS7-14	S/M-RSS	**Table Drain Crossings Sector 14** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain	$37,200	14	22
49	DS8-11	S/M-RSS	**Table Drains Sector 14** - construct stabilised table drains (not including specific sites mentioned in other short/medium term measures).	$60,000	14	22
135	DL3-14	L-RSS	**5yr ARI Piped Drainage Sector 14** -Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	14	22
7	DS2-4 (DS2 and WR14)	S/M-RSS	Modify the profile of Florence Terrace (**Sector 14**)	$15,188	14	68
70	WR35	S/M-RSS	Re-profile the intersection of Florence Terrace and Elsie St	$22,500	14	68
152	P14-4	L-RSS	**Florence Pavement Sector 14** - construct new/rehabilitate existing flexible pavement (ie insitu profiled and stabilised basecourse over two coat flush seal) for full length of Florence Terrace (4 stages)	$354,375	14	141
89	T7-1	L-RSS	Provide turning area/tie hammer head or similar) at the "dead end" on Florence Tce (incl guard rail and retaining structures)	$151,250	14	152
101	S17-5	L-RSS	**Passing Bays Stage 5** - Incorporation of passing bays at regular intervals within the road reserve (all roads)	$120,000	14	173
SECTOR 15						
121	DL2-15	L-RSS	**Trunk Drainage Sector 15** - Define and construct 100yr ARI capacity major trunk drainage routes for all major catchments. These are envisaged to consist of natural/lo/w rock lined creeks/overland flow channels (refer to Figure R12) in combination with culverts at all road crossings (refer to Figure R12)	$150,000	15	4
22	DS4-15	S/M-RSS	**Waterbars/Crossbanks Sector 15** - Install waterbars/cross banks for all unsealed roads (not including specific sites mentioned in other short/medium term	$14,400	15	22

No.	Measure No.	Type	Measure Description	Total Capital Cost Estimate (AU$ 2011)	Construction Sector (1 to 15)	Rank #
			measures)			
38	DS7-15	S/M-RSS	**Table Drain Crossings Sector 15** - Pathway/driveway culvert crossing to be established at each pathway/driveway crossing of a table drain.	$37,200	15	22
50	DS8-12	S/M-RSS	**Table Drains Sector 15** - construct stabilised table drains (not including specific sites mentioned in other short/medium term measures).	$60,000	15	22
86	WR64	S/M-RSS	Duplicate the Catherine Park road culvert	$45,000	15	22
181	SWM7-16	L-SWMS	Implement public stormwater treatment measures as illustrated in Figure S7- BRS10	$73,400	15	22
87	WR67	S/M-RSS	Enlarge the detention basin upstream of the Catherine Park culvert	$157,500	15	68
136	DL3-15	L-RSS	**5yr ARI Piped Drainage Sector 15**- Install 5yr ARI capacity minor piped drainage lines within the public roads/shareways feeding into all trunk drainage culverts (refer to Figure R13)	$82,500	15	68
71	WR39	S/M-RSS	Install additional cross banks on upper Kevin St.	$15,000	15	118
82	WR57	S/M-RSS	Form a silt trap at base of eastern cutting on the Elizabeth Park track	$3,000	15	126
79	WR51	S/M-RSS	Establish silt storage areas in Elizabeth Park or any other suitable location. Use these areas to store silt collected from table drain maintenance operations. Treat with gypsum and mix with organics to form a source of topsoil for the rehabilitation of road banks and table drains	$7,500	15	133
148	[illegible]	L-RSS	Construct new/rehabilitate existing flexible pavement *(to insitu profiled and stabilised basecourse over two coat flush seal)* for full length of Kevin Ave	$315,000	15	162
146	P10 and S4	L-RSS	Construct rigid pavement *(or equivalent)* on steep section of fire trail extending from the end of Kevin Ave between approx. chainages 150 and 300 *(refer to Figure R3 for road chainage details)*	$558,000	15	179
59	WR9	S/M-RSS	Construct an elevated footpath/stairway on the inside of the sharp bend on the Elizabeth park track just up slope of Kevin St, or otherwise make this track safe for all weather pedestrian access	$180,000	15	181

Notes:
** This measure is placed as a high priority to enable effective and cost efficient construction of all other measures on the Island

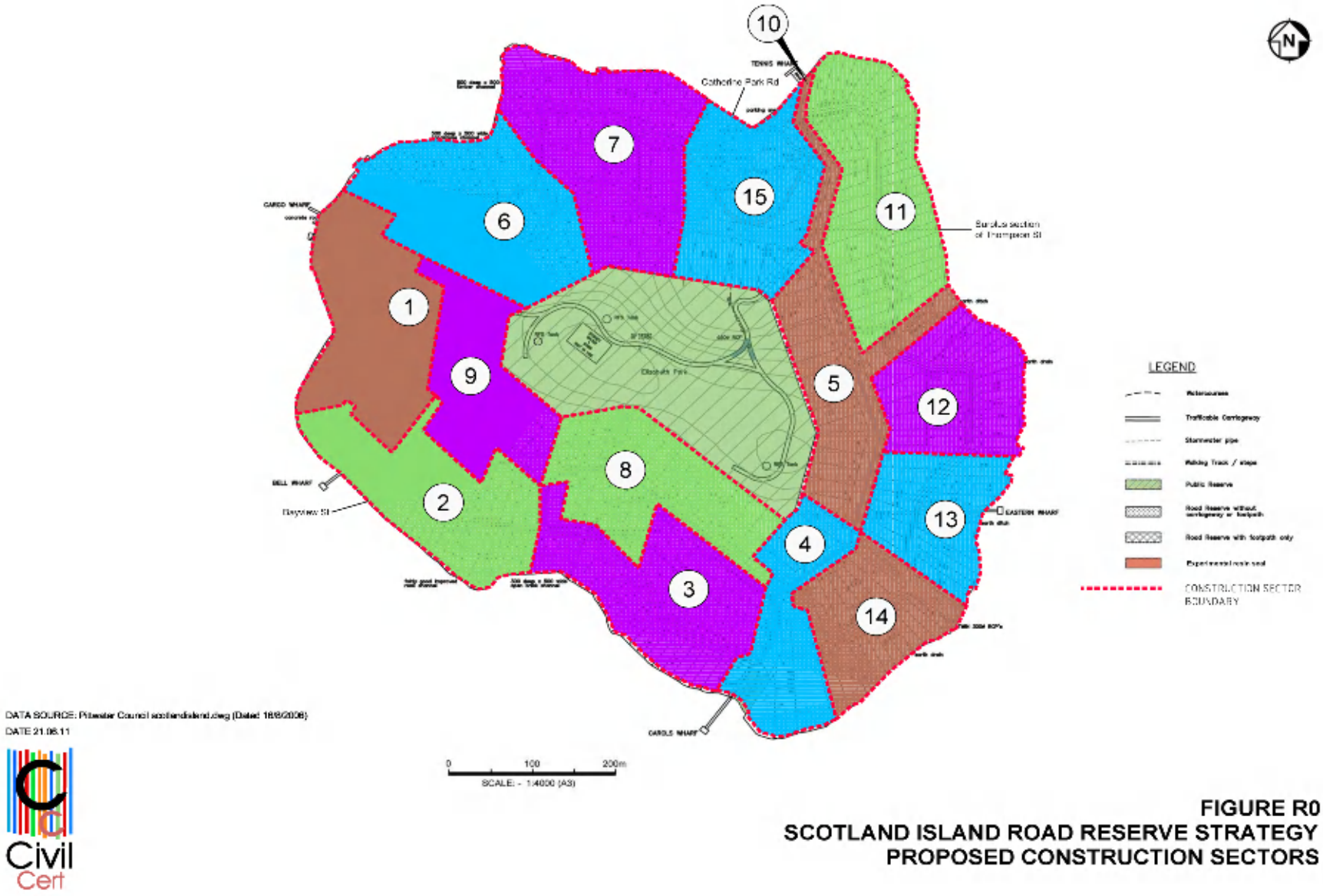

FIGURE R0
SCOTLAND ISLAND ROAD RESERVE STRATEGY
PROPOSED CONSTRUCTION SECTORS