

# SCOTT POINT CATCHMENT MANAGEMENT PLAN

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## **ABSTRACT**

Working collaboratively with the Auckland Council Stormwater Unit (SWU), a Stormwater Management Plan (SMP) has been completed for the Scott Point Peninsula. Scott Point is a 156 ha greenfield Special Housing Area located in the north western Waitemata Harbour. The land development will be a mixture of residential housing with an average lot size of 300m<sup>2</sup>. The Scott Point SMP is the first plan to be submitted and assessed under the Proposed Auckland Unitary Plan (PAUP). The SMP is based on integrated land development incorporating onsite water sensitive design as a core development approach.

The Scott Point Peninsula is surrounded by a sensitive coastal receiving environment (Appendix 1). Onsite stormwater management within private lots and road reserves will achieve the outcomes sought by the Stormwater Management Flow and Water Quality Rules. This approach delivers a unique stormwater management response with a significant shift from traditional end of pipe treatment systems by removing 10 out of 12 originally proposed communal wetlands. A tool box of best practicable options is presented to treat not only suspended sediments but also heavy metals and reduce water temperature at source.

Working in partnership with the Auckland Council SWU was crucial in order to deliver a design outcome strongly aligned to the new water quality targets and overall urban design vision.

This paper will outline how the first SMP in Auckland under the new PAUP was completed using a range of best practicable options to protect the receiving environment. Adopting a collaborative working model with the SWU was critically important helping immensely for Council and Client alike to navigate and interpret the new rules in the absence of final supporting technical guidance. The Scott Point SMP is a test case for the implementation of the PAUP to ensure the flow and new treatment targets are achieved for new greenfield development.

## **Proposed Auckland Unitary Plan, Water Sensitive Design, Retention, Detention, Green Infrastructure, Stormwater Management Area Flow**

### **PRESENTER PROFILE**

Mike Chapman is a Senior Hydrologist at Harrison Grierson. Mike is the principal Author and lead designer for the Scott Point Stormwater Management. Mike has worked for 16 years on water sensitive design and flood risk studies in New Zealand, India and the UK.

Katja King-Borrero is a Senior Stormwater Specialist at Auckland Council. Katja's key role within the Stormwater Unit is to work with applicants for Plan Variations and internal stakeholders to develop integrated stormwater solutions and to reflect these in the Plan Variation. Katja has worked as a planner in the water industry for over 11 years.

# 1 INTRODUCTION

Scott Point is located in the Auckland Region in the northern Waitemata Harbour adjacent to Upper Harbour Drive. The structure plan covers an area of approximately 158ha of predominantly rural land.

Scott Point is a Special Housing Area (SHA) and it has been assessed under the Proposed Auckland Unitary Plan (PAUP). The Scott Point SHA was the first to go to the Auckland Council's Stormwater Unit as a stormwater workstream. With three receiving environments and an earlier stormwater concept developed under 'business as usual' initial meetings between Harrison Grierson and Auckland Council centered on closer alignment to the stormwater management philosophy in the PAUP.

A core development approach was discussed for Scott Point with the intention to adopt Water Sensitive Design (WSD) to mitigate the adverse effects of stormwater runoff on the receiving environment. WSD is well documented and has been adopted in various shapes and forms within New Zealand and around the world in particular the United States. The concept, in its purest sense, seeks to mimic the natural hydrological processes that existed on the site before human intervention. Those processes include rainfall interception by vegetation, evapotranspiration, uptake of water by plants, soakage through soil, groundwater recharge and surface runoff to streams and rivers.

For Scott Point, on site management is the preferred option to reduce stormwater contaminants, volumes and peak flows entering the receiving environment. The overarching principle of on site management is to control and treat rainwater where it falls at source – a commonly referred term for this is 'source control'.

Apart from the Bomb Bay and Nimrod Inlets, the majority of the Scott Point Peninsula is shaped by numerous dry gullies and small sub catchments which connect directly to the coast. This landform lends itself well to source control and onsite management of stormwater. Without source control, our preliminary investigations revealed a dozen or so communal wetlands would be required – essentially a pipe to wetland design with minimal earth working. It was clear from early discussions with the Auckland Council Housing Project Office (HPO) that this number of communal wetlands would not be acceptable and a clear indication was given by the HPO to use WSD to come up with best practical options for Scott Point in line with the new PAUP and supporting guidance.

## 2 HPO WAY OF WORKING

The Housing Project Office was established to deliver on the targets set in the Auckland Housing Accord. The Accord sets a target of 39,000 new building or subdivision consents over three years.

The HPO works in an integrated, collaborative and solution focused manner with developers, provides an end-to-end service for applicants. Specialists from infrastructure providers are a part of the HPO including Stormwater, Auckland Transport, Watercare and New Zealand Transport Agency (NZTA). There is a strong focus placed on the pre-application process where specialists can come together to work through the project. This allows for inter-disciplinary collaboration, but also collaboration between council and applicants and their specialists. The development of a design solution, particularly for larger greenfields areas, will typically move between a broader phase consisting of inter-disciplinary workshops to a more detailed phase of specialist workstreams as plans and designs are developed. An important part of this process is constraints mapping so that

yields and road alignments appropriately consider natural features that restrict development potential. The HPO Master Planning team maintains oversight of both phases.

The Scott Point SHA was the first to go to the Auckland Council's Stormwater Unit as a stormwater workstream. With three receiving environments and an earlier stormwater concept developed under 'business as usual' initial meetings centered on the revised stormwater approach in the PAUP.

## **2.1 PAUP**

The PAUP has made a step change in the management of stormwater. The change has come about in response to stream loss and the degradation of stream health in the Auckland Region. There is a new focus on the overarching concept of Water Sensitive Design. This entails a more integrated design response for new development than has occurred previously. Larger scale developments should place a greater emphasis on working with the natural systems on the site to protect and enhance them. There are new requirements to mitigate the hydrological effects of new impervious surface on streams by seeking to more closely mimic the natural hydrological regime. There is also an across the board requirement for targeted quality treatment of high contaminant generating activities.

The PAUP places greater emphasis on achieving Water Sensitive Design (WSD) in greenfields developments which offer greater opportunities for comprehensive implementation of WSD. Land being developed within the Future Urban zone must undergo a Plan Variation to the PAUP to establish residential zoning which may include a Precinct Plan. Both the Housing Accord and Special Housing Area Act (HASHAA) and the Resource Management Act (RMA) require District Plan Variations to give effect to the regional policy statement and not be inconsistent with a regional plan for a number of matters including integrated management of natural and physical resources; the control of the use of land for the purpose of the maintenance and enhancement of the quality of water in water bodies and coastal water; the maintenance of the quantity of water in water bodies and coastal water; the maintenance and enhancement of ecosystems in water bodies and coastal water and the avoidance or mitigation of natural hazards. Therefore applicants for Plan Variations are required to implement water sensitive design in accordance with the PAUP. The key objectives and policies in the PAUP Regional Policy Statement (1 B 6.3) place an emphasis on:

- The protection and enhancement of freshwater systems, including intermittent streams (avoidance of reclamation)
- Comprehensive and integrated land use and water management planning processes
- The adoption of Water Sensitive Design and the use of green infrastructure as a core development approach
- Using land use change and development opportunities to reduce adverse effects of existing land use

Consideration of the Best Practicable Option has been retained as has controlling the extent of impervious surface as a means of managing effects of stormwater.

The Regional Objectives and Policies (2 C 5.15.1) provide more detailed guidance including direction to:

- Use on-site stormwater management devices to reduce contaminants (including temperature), volumes and peak flows unless a downstream communal device can achieve the same or better level of stormwater management performance.
- Providing infrastructure that meets council's requirements, which includes compliance with design standards and maintenance and operational requirements.

Because a key component of WSD is protecting natural hydraulic features from land development a Green Infrastructure Corridor Zone has been developed that can be applied to land used primarily for stormwater management and flood mitigation purposes.

Brownfields development and most other applications for subdivisions and residential developments will be within land that is already zoned and therefore considered within a resource consent framework (or Qualifying Development). Controls and assessment criteria are included for land use activities including subdivision, the development of Framework Plans, development of impervious surface, development in areas that discharge to streams that are sensitive to development Stormwater Management Area Flow (SMAF) overlays and high contaminant generating activities. These controls and criteria require the use of WSD and compliance with Auckland Council standards. This includes the Auckland Council Code of Practice (Stormwater) which incorporates WSD.

In general developments are required to:

- Mitigate hydrological effects where they discharge to streams
- Mitigate contaminants arising from high contaminant generating activities with consideration of contaminant management for larger scale developments in the context of their receiving environment.
- Avoid development that will be affected by natural hazards including flood plains and coastal inundation. Residential development in the 1:100 year flood plain is not considered appropriate and other measures (including floor levels) are adopted for flood sensitive areas.

Overall the retention of intermittent streams and the retention component of the SMAF rules (re-using or infiltrating the first 10mm of rainfall to mitigate the hydrological effects of new impervious surface) has tended to create a more dispersed approach to stormwater management. This is because both requirements preclude the use of large scale communal devices which cannot achieve the retention requirement. Retention of intermittent streams results in smaller catchments with a need for the protection of base flows higher up in the catchment. Devices that provide treatment by infiltration are also far more efficient at managing temperature effects – a pollutant in streams. Therefore design responses will tend towards dispersed on-site devices such as rain gardens and tree pits, tanks, infiltration trenches and the use of pervious paving and living roofs to reduce the amount of impervious area to be mitigated. The increase in the use of devices on private devices (to be maintained by private home owners) is managed via the Stormwater Bylaw.

### **3 WHAT IS THE SCOTT POINT SMP BASED ON?**

This stormwater management plan is based on the currently proposed structure plan layout (See Appendix 1) and considers the solutions already approved by Auckland Council for the development of the adjoining site within the Hobsonville area. This plan includes the following:

- Stormwater treatment – focus on implementing water design solutions for each sub catchment that are endorsed by Auckland Council such as: limited number of wetlands, rain-gardens, tree-pits, porous paving and vegetative swales. The proposed treatment train approach has to provide for contaminant removal such that there are no environmental constraints on the discharge of stormwater into the receiving marine waters.
- Discharge of contaminants such as hydrocarbons and suspended solids from land-uses such as secondary roads will be prevented through the use of source control water treatment devices. The aim of treatment systems such as rain gardens and vegetative swales is to promote bio-filtration of surface water, to recharge groundwater and reduce runoff temperatures.
- The PAUP promotes the use of drainage to ground wherever possible as an effective means to treat stormwater and recharge groundwater and protection of streams and riparian areas from erosion.
- Protection of the groundwater underlying Scott Point from contamination during the earthworks and construction phase of the development and during the lifetime of the development.

#### **4 WHAT ARE THE OUTCOMES OF THE SCOTT POINT SMP?**

The SMP outcomes are:

- Set a water sensitive urban design and treatment train framework which mitigates the impact of land use change from countryside living to urban.
- Set best practicable management options for stormwater within the Scott Point catchment.
- Achieve compliance with, GD.04, TP10, TP124 and TP90 and the water quality rules within the PAUP.
- Achieve compliance with the SMAF 1 10mm retention rule.
- To provide for retention of the stream network (Bomb Bay and Nimrod Streams) and protection and enhancement of riparian margins.
- Protection and restoration (where applicable) of in-stream ecological and amenity values.
- Identify flood risk areas and ensure any development is located outside the floodplain.
- Provide indicative locations for stormwater management structures.
- Promote water conservation and demand minimisation.
- Recognise opportunities to manage stormwater areas for multiple values and functions.

#### **5 FLOOD RISK**

Overland flow paths within the peninsula are clearly shown to follow the existing topography. The 2D flood model picks up the broad overland flow paths and a number of discrete steeper channels draining directly to the coast.

Using the 'source-pathway-receptor' model for risk assessment, the result shows that the flood source is predominantly generated on site. There is one area of inflow to the site to the north from Walker Crescent. This overland flow path is directed towards the northern stream which links the site with the existing development across Clark Road. This development has a stormwater outlet to this stream. To the south there could be another region of overland flow across Scott Road, although the road is likely to intercept this flow and direct it towards the south east.

The flood source within the Scott Point catchment during a 100 year event is not from an existing network or from a stream or river flowing into the site; the source is from ponding and overland flow generated by direct rainfall on site.

## **6 STREAMS**

Two major watercourses are present on the site forming the main superficial drainage paths in Scott Point Peninsula. The first watercourse is located within the central part of the area and flows from southwest to east northeast direction towards Nimrod Inlet. The second watercourse is located in the northern part of the area, flowing from northwest to east towards Bomb Bay. Due to low soil permeability and potentially high groundwater levels a number of wet and swampy areas may exist particularly in ground depressions or flat lying areas with slow surface drainage.

## **7 STORMWATER MANAGEMENT APPROACH**

The approach for Scott Point is to focus on options which retain (and by default treat) 10mm of stormwater runoff onsite with a minimal number of communal devices using natural drainage systems and processes.

The idea is to reduce the number of downstream communal wetlands. Wetlands are not needed across the peninsula because there good opportunities to treat at source given the housing typologies and fragmented nature of the natural sub catchments across the peninsula. The development is largely residential with no high contaminant generating activities (HCGAs) as defined in the PAUP although overall a WSD approach is still required and water quality volume treatment has been agreed for all roads draining to the coastal marine area. The 10mm retention criteria for all housing typologies (other than Terrace and Apartments) will provide a good level of treatment for impervious areas on each lot prior to connecting to the pipe network. Research has shown significant improvements to water quality entering the receiving environment if the first 10mm of rainfall can be captured and retained on site.

The primary pipe network is designed to convey the 10 year ARI peak runoff from all roads, public parking areas and from private lots, without surcharging. The stormwater layout plan in the SMP shows a primary pipe network which is aligned to the future road layout (See Appendix 2).

This primary network takes into account the various stages of development and caters for upstream landowners where necessary. Due to the natural topography and numerous small gullies draining directly to the coastal area, the Peninsula naturally lends itself to smaller sub catchments each draining to a discrete coastal outlet. The trunk main therefore is not expected to be of a great size and most likely be in the order of a 600mm to 750mm diameter pipe at each outlet but this will be finalised at consent stage.

The secondary flow network is designed to accommodate flood flows up to the 100yr + climate change event within the entire road reserve and open space reserves.

Riparian margins will be provided for both streams and coastal edge. The riparian width either side of the Bomb Bay and Nimrod stream is 10m and the esplanade width at the coastal margin is 20m wide. There will be no loss of floodplain storage alongside each stream and culverts for new road crossings shall be designed to convey the 100yr flow.

## 8 HOW TO IMPLEMENT SMAF 1 AT SCOTT POINT

The following tables outline how the SMAF 1 rules apply to each land use type. A number of options can be used to achieve the criteria set in the following tables.

TABLE 1: TREATMENT REQUIREMENTS: BOMB BAY ESTUARY CATCHMENT 1			
LAND USE		ONSITE	COMMUNAL (WETLAND 1)
House Zones	Terraced Housing/Apartments		WQV
	Mixed housing Urban	10mm	
Roads	Secondary	WQV	
	Minor	WQV	
Open Space	Neighbourhood Centre		WQV

TABLE 2: TREATMENT REQUIREMENTS: NIMROD STREAM CATCHMENT 2			
LAND USE		ONSITE	COMMUNAL (WETLAND 2)
Roads	Secondary	10mm Retention	95 <sup>th</sup> Percentile
	Minor	10mm Retention	95 <sup>th</sup> Percentile
House Zones	Mixed housing Urban	10mm Retention	95 <sup>th</sup> Percentile
Open Space	Parking	10mm Retention	95 <sup>th</sup> Percentile
	Buildings	10mm Retention	95 <sup>th</sup> Percentile
	Neighbourhood Centre		95 <sup>th</sup> Percentile

TABLE 3: TREATMENT REQUIREMENTS: BOMB BAY STREAM CATCHMENT 3			
LAND USE		ONSITE	COMMUNAL
Roads	Secondary	95 <sup>th</sup> Percentile	
	Minor	95 <sup>th</sup> Percentile	
House Zones	Mixed housing Urban	95 <sup>th</sup> Percentile	
Open Space	Parking	95 <sup>th</sup> Percentile	
	Buildings	95 <sup>th</sup> Percentile	

TABLE 4: TREATMENT REQUIREMENTS: PENINSULA CATCHMENT 4			
LAND USE		ONSITE	COMMUNAL
Roads	Secondary	WQV	
	Minor	WQV	
House Zones	Single	10mm Retention	
	Mixed Housing Suburban	10mm Retention	
	Mixed housing Urban	10mm Retention	
Open Space	Parking	WQV	
	Buildings	10mm Retention	

**Notes:**

- \* WQV = 1/3 of 2yr rain event
- \* 10mm = First 10mm of rainfall retained onsite and not released
- \* 95<sup>th</sup> Percentile (35mm) - 10mm retention = 25mm of rainfall detained on site and released slowly over 24hrs
- \* All catch pits shall utilise inserts
- \* There shall be no high contaminant yielding roofing, spouting, cladding material or architectural features used
- \* Vegetative swales are required at each outlet to the CMA within the Peninsula Catchment
- \* Culverts for stream crossings shall be sized to convey the 100yr peak flow and contain natural substrate to provide for fish passage

## 9 BEST PRACTICABLE OPTIONS TO ACHIEVE SMAF 1

A range of measures can be implemented within road reserves and on individual private lots for all development typologies (single house, mixed housing suburban and mixed housing urban) according to receiving environment as per the tables above. These measures include:

- Shallow rain gardens or simple filter trenches at the front of each lot with overflow to the pipe network.
- If above ground space is limited, then underground storage tanks or trenches with seepage to ground and overflow to the pipe network. Roof areas can also drain to these tanks if required.
- Permeable paving from hardstand areas such as private driveways, roof water can also drain to the permeable paving sub base if this is considered the best option for a particular house lot provided the design take into account additional volume from the roof.
- Rain tanks for non potable use including toilet flushing with overflow connection to the pipe network.
- Living roof systems.
- Drainage from minor roads will be to the primary pipe system , sized to a 10yr capacity, via catch pit traps following treatment within tree pits with final polish via vegetative swales (not sized for 10mm) at each outlet.
- Drainage from secondary roads will be to the primary pipe system, sized to a 10yr capacity, via catch pit traps following treatment within raingardens with final polish via vegetative swales at each outlet.
- Drainage from the coastal road will be via single cross fall to an adjacent vegetative swale (alongside the esplanade reserve) sized to a 10yr capacity prior to connection to each outlet.
- Each primary pipe outlet to the coastal marine area will be via vegetative channels/swales located within the coastal esplanade reserve (~20m). These channels will provide final polish of stormwater.
- Catch pit traps within all roads, car parking and private lanes.
- Use inert roof materials.

### 9.1 ROAD HIERARCHY

A 2.5m width has been allocated within the local roads and secondary roads for rain gardens and/or tree pits (see Appendix 3). A single 2.2m width is provided within the coastal connection road/Park Edge for a vegetative swale. A vegetative swale is not



needed if the coastal connection becomes just a pedestrian walkway rather than a vehicle road. Details on rain garden sizing and swales are provided later in this SMP.

## **10 CONCLUSIONS**

- Following a water sensitive design approach has led to a substantial reduction in the number of 'end of line' communal stormwater devices and will result in higher standard of water quality entering the receiving environment.
- Working with the new PAUP rules and policy was a learning curve for both us and the Auckland Council. Adopting a collaborative approach and essentially working as one team was the only way we believe we could have successfully navigated our way through the process.
- Combine this with a group of highly motivated landowners who were receptive to these new ideas allowed us to implement the SMAF1 requirements successfully.
- It is clear a number of stormwater options can be used to achieve the SMAF 1 requirements and TP 10 Water Quality Volume. For example a private lot could implement porous concrete to manage the driveway runoff with roof water directed to a rain tank or to a simple filter trench at the front of the house planted with native grasses.
- Baseflow to the Bomb Bay Stream and Nimrod Stream will be promoted through the use of onsite devices and rain gardens/tree pits within the road reserves.
- This SMP is designed to provide flexibility at sub division consent stage and in setting rules for at source controls.
- At source treatment is required. The final option to meet the 10mm retention and 25mm detention target will be decided at sub division consent stage using the best practicable options in this SMP.
- Vegetative swales across the esplanade reserve will be provided at each coastal outlet with pedestrian/cycle access across each channel.
- The SMP sets aside space (2.5m) within the road layout for a number of rain-gardens/tree pits within the riparian corridor and within the road reserve. The road cross section plans show this space allocation for source treatment.
- Monitoring will be undertaken once the entire system is fully functioning to ensure the water returning to the receiving environment is of high quality in accordance with TP 10 standards.
- Operation and maintenance plans will be required at land use consent stage for any vested infrastructure.

**ALL FIGURES ARE PROVIDED IN THE APPENDICES**

## **ACKNOWLEDGEMENTS**

The Scott Point Landowners Group



TRANSPORT ELEMENTS

PRECINCT PLAN 2



Scott Point  
15 January 2015  
Scale 1:7500 at A3



- Key**
- Scott Point Precinct Boundary
  - Secondary Road (20.0m)
  - Critical Local Road (16.0m) (flexible location)
  - Park Edge Road (16.0m)
  - Required Coastal Connection (Vehicle or Pedestrian) (15.0m or 6.0m)
  - Proposed Bus Route
  - Cycle Metro Route
  - Critical Pedestrian & Cycle Connection (location specific)
  - Vehicle Access Restriction
  - On-street Communal Pocket Space

**Zones**

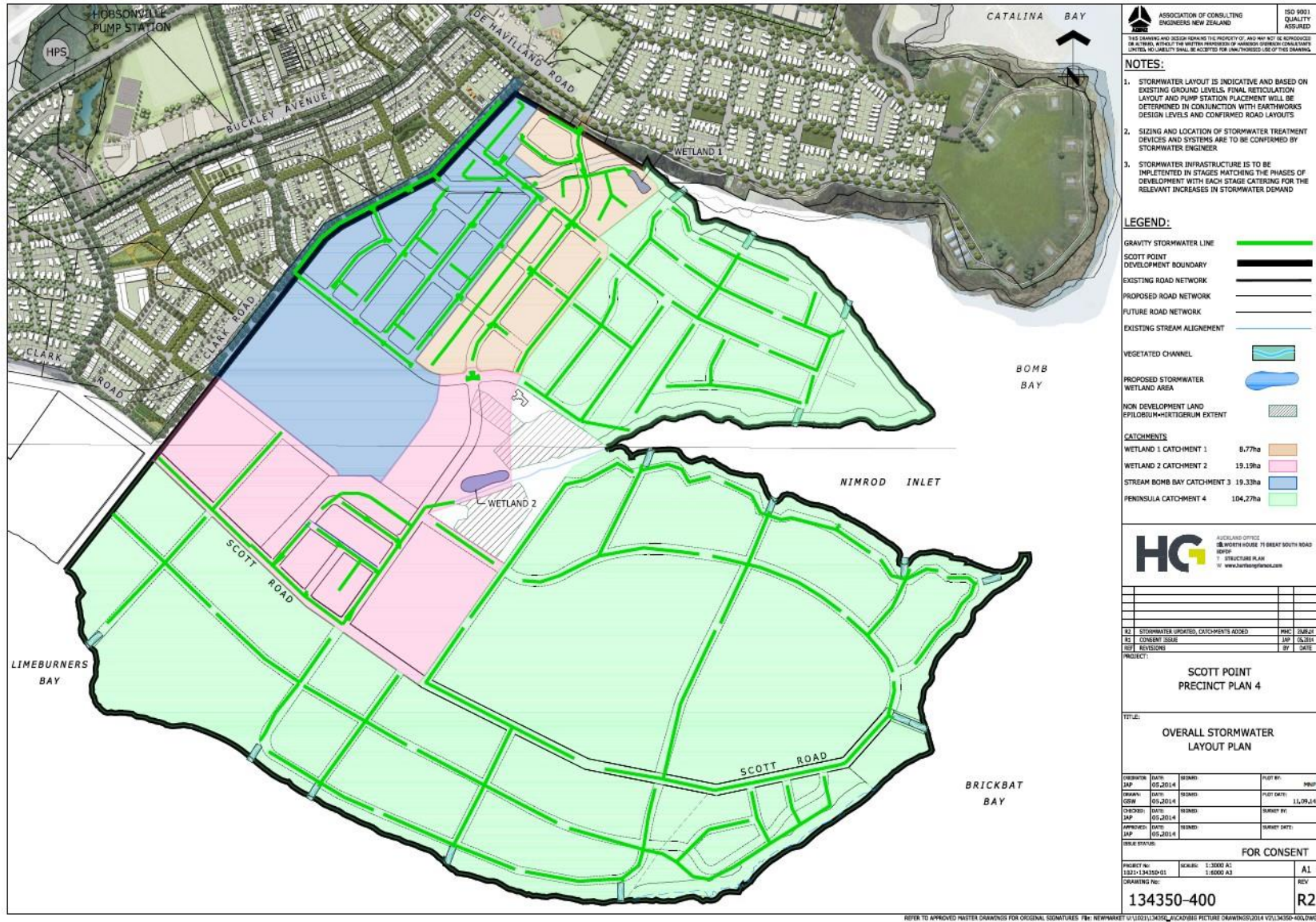
- Single House
- Mixed Housing Suburban
- Mixed Housing Urban
- Terrace Housing & Apartment Buildings
- Neighbourhood Centre
- Public Open Space - Conservation
- Public Open Space - Sport & Active Recreation
- Public Open Space - Informal Recreation

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precinct plan 1- v3.dwg

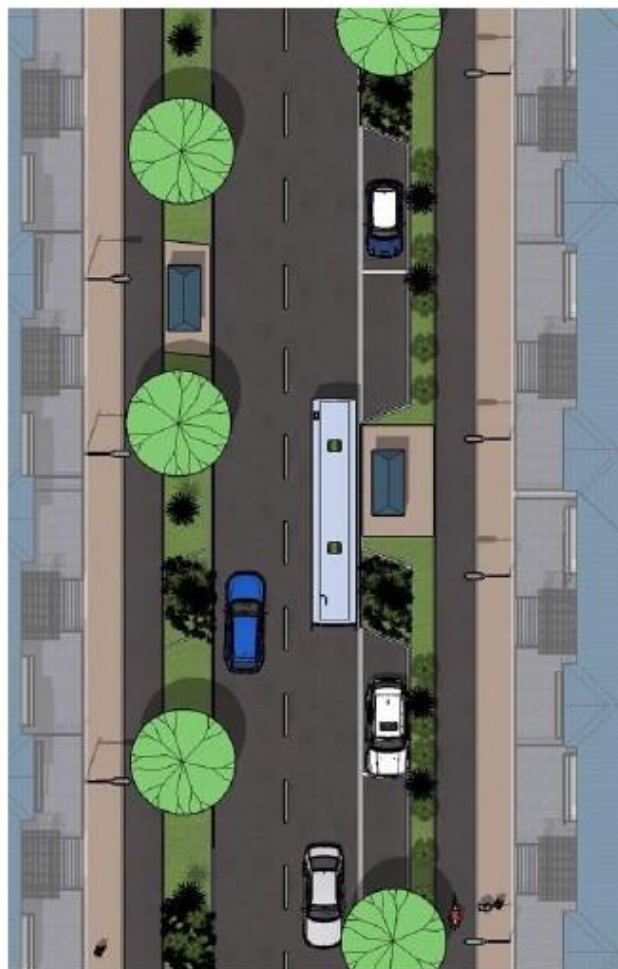
Appendix 2







# I PRECINCT PLAN 2: ROADING TYPOLOGIES



**SECONDARY ROAD WITH  
CYCLE METRO ROUTE  
PLAN AND SECTION**



SCOTT POINT

**HARRISON  
GRIERSON**

Project No. 1001-134350-01  
Date: 27 June 2014  
Plan View Scale: 1:200 at A3

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