



WOODS

Dry Basin Operations & Maintenance Manual (Draft)

Arataki Project

CDL Land New Zealand Limited

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1.0 Introduction

This operations and maintenance (O&M) manual details the proposed basin design for the Arataki development by CDL Land New Zealand Limited (CDL). The basin location is shown in Figure 1.



Figure 1: Dry basin location

It is intended that this O&M manual provides:

- Background information on the stormwater treatment and detention facilities at the Basin;
- Basic background information on the contributing stormwater catchment;
- Design details for the stormwater treatment and detention system; and
- O&M details.

This manual excludes information on the stormwater reticulation system within the contributing catchment area.

This manual is to be updated following consent and construction, with final O&M to be provided with CCC.

1.1. Contact Information

A summary of the contact information relating to the ownership, maintenance manager and designer for the basin is included in Table 1.

Table 1. Contact Information

Asset ID	Resource Consent Number	Development Name / Legal Description:
Location:		
Asset Owner Details:		
Name:		Address Private Bag 92300, Auckland 1142
Telephone Number:		
Email:		
Maintenance Manager Emergency Contact Details:		
Name:		
Telephone Number: (Daytime)		

Telephone Number: (Out of Hours) Email:		
Designer Details:		
Name: Telephone Number: Email:		
Applicant Details:		
Name: Telephone Number: Email:		
Landowner Details:		
Name: Telephone number: Email:		
Notes / Restrictions / Access		

2.0 System Description

2.1. Catchment Description

The Basin provides stormwater treatment and detention for an approximate 10.1 ha stormwater catchment, as detailed in Table 2.

Table 2. Catchments contributing to Dry Basin

	Total impervious area (ha)	Total pervious area (ha)	Total contributing catchment area (ha)
Catchment Contributing to the Basin	6.4	3.7	10.1

2.2. Design Philosophy

The purpose of the proposed basin is to provide stormwater treatment and detention for the contributing catchments. The basin was designed to improve water quality through reducing contaminants such as Total Suspended Solids (TSS) before entering the receiving environments. Planting around the basin promotes biodiversity and improves public perception of the stormwater device.

2.2.1. Key Features

The basin was designed to meet the following design requirements.

Water Quality:

- Provide water quality treatment.

Hydrology Mitigation:

- Detention – Provide extended detention volume and a drain-down period of 24 hours.
- Attenuation – Provide attenuation of peak post development flows for 2-year and 10-year annual recurrence interval (ARI) events generated by the developed site to 80% of the predevelopment.
- Attenuation – Provide attenuation for the peak post-development flow for the 100-year ARI to 80% of the predevelopment level.

2.2.2. Timeline

Construction is not yet completed. This section will be completed after the Basin is constructed and vested.

2.2.3. Critical Levels as per approved Design and As-built Data

The design has not yet been approved. This section will be completed once the design of the Basin has been approved.

2.2.4. Dam Information

The basin is not a classifiable dam according to the Building (Dam Safety) Regulations 2022. This is because it does not fulfil one of the criteria of:

- having a dam height greater than 4 m and impounding a volume greater than 20,000m³. Or
- having a dam height greater than 1 m and impounding a volume greater than 40,000m³. Therefore, the basin does not require a Potential Impact Classification (PIC) assessment.

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2.3. As-Built Information

To be provided following consent and construction.

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2.4. Design Standards and Assumptions

The proposed basin is designed to provide management of the extended detention volume and attenuate peak post development flows for 2-, 10- and 100-year ARI generated on site to 80% of the predevelopment flows.

2.5. Ground Conditions

The basin shall be constructed as per the recommendations of the geotechnical report.

2.6. Consent Information

To be provided following consent approval.

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3.0 System Components

3.1. Inlet Structure Details

The basin has a single inlet. The inlet details can be summarised in Table 3 below. Refer to drawing P24-244-00-3850-DR for further details.

Table 3. Dry Basin Inlets

Dry Basin	
Inlet structure	DN825

3.1.1. Routine Maintenance

Key routine maintenance actions identified for the basin inlets are summarised in Table 4 below.

Table 4. Basin inlet maintenance actions

Component	Recommended Action
Basin Inlets and Energy	Inspect for clogging and buildup of debris and rubbish. Debris should not block or threaten to obstruct any stormwater inflow points.
Dissipation / Erosion Protection Structures	The area around the inlet and energy dissipation (e.g. rip rap) structures should also be inspected for erosion and cracks in the structure. Remove debris and litter and fix cracks and erosion as necessary.

3.1.2. Health and Safety Risks Associated with Dry Basin Inlet Structure Maintenance

There are a number of health and safety risks associated with working inlet structures. Some of these potential risks are highlighted in Table 5 below.

Table 5. Health and safety risks associated with working around inlet structures

Risk	Mitigation
Steep and slippery banks	Take care and avoid wet soil conditions.
Flow through inlet making work unsafe (i.e. >0.5 m/s)	Ensure no rainfall has occurred in the last 24 hours and non in forecast
Confined space within inlet pipe	Do not enter the confined space.
Deep manholes	Do not enter the confined space. Take extra care when opening manholes.

3.2. Outlet Structure Details

The basin outlet structure details can be found in Table 6. To be updated following the as-built survey. Refer to drawing P24-244-00-3850-DR for further details.

Table 6. Outlet details

	Dry Basin
Orifice	146 mm
Outflow control manhole	1050mm
Vertical Slot	230 mm
Outlet pipe	DN600

3.2.1. Routine Maintenance

Key routine maintenance actions identified for the basin outlet structure is summarised in Table 7 below.

Table 7. Basin outlet maintenance actions

Component	Recommended Action
Basin outlets	Inspect basin outlets for blockages caused by heavy sedimentation, floating debris, and rubbish. The areas around the outlet control structure should be free of blockages and dense vegetation to maintain an unobstructed flow path for stormwater.
	Inspect for evidence of leaky joints or soil seeping around outflow pipe barrel.
	Inspect outfall and water discharge areas for erosion (presence and severity within 30 m of discharge point).
	Restore eroded areas and stabilise as necessary.
	Erosion (washout, scouring) around outflow pipes can be caused by water flowing from the basin and out along the outside of pipe, which can lead to embankment failure.
Erosion Protection	Inspect areas of erosion protection (rip rap, reno mattress, gabions) to identify any damage or loss of material. Identify any preferential flow paths forming through erosion protection that could be affecting function. Repairs should be carried out as required.
Debris Screens	The debris screens should be inspected for the build-up of pollutants, leaves, sticks, branches, litter, and other debris.

	<p>Accumulated debris can hinder stormwater flows and cause localised flooding, and these should be removed and properly disposed of at an appropriate disposal facility.</p> <p>Visually inspect the debris screens for signs of corrosion, repair or replace if necessary. Check lock and chain for any rust or damage.</p>
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3.2.2. Stream Outfall Maintenance Access Requirements

The basin outlet is incorporated into a scruffy dome structure. Plan P24-244-00-3852-DR highlights this. A maintenance vehicle could park on the access track or maintenance track and personnel access the outfall by foot, by walking over the emergency spillway.

Where mechanical equipment such as excavators or vacuum trucks are required to remove larger debris and sediment buildup from the outfall, a sucker truck could park on the access track or maintenance track of the basin, and the suction hose carried down manually to the riprap. For vehicular access in closer proximity to the outfall for other maintenance activities, off-road vehicles such as 4WD or excavators, equipped with suitable traction and suspension systems to navigate the outfall access track is recommended. These can park on the access platform above the outfall structure.

Use of vehicles requires careful coordination to minimise environmental impacts.

3.2.3. Health and Safety Risks Associated with Dry Basin Outlet Structure Maintenance

There are a number of health and safety risks associated with working around waterbodies and outlet structures. Some of these potential risks are highlighted in Table 8 below.

Table 8. Health and safety risks associated with working around Dry Basin outlet structures

Risk	Mitigation
Deep water (i.e. deeper than knee depth)	Do not enter the water, have rescue rope and second person available.
Removing blockage may generate high flow velocities	Lower water level before removing blockage.
Flow through basin making work unsafe (i.e. >0.5 m/s)	Ensure no rainfall has occurred in the last 24 hours and none is forecast.
Confined space within outlet structure	Do not enter the outlet structure.
Fall Hazard	Avoid accessing close to steep drop offs, ensure safe site access

3.3. Emergency Spillway

The basin emergency spillway details are shown in Table 9 below. To be updated following the as-built survey.

Table 9. Spillway details

	Dry Basin
Invert of Emergency spillway	14.36mRL

3.3.1. Routine Maintenance

Key routine maintenance actions identified for basin spillway structures are summarised in Table 10 below.

Table 10. Maintenance actions

Component	Recommended Action
Emergency Spillway	<p>Inspect and maintain grass cover at 100 mm height. Ensure spillway is clear of trees and shrubs (only grass present).</p> <p>Inspect earth embankment for erosion, scour, slumping and any loss of soil.</p> <p>Cavities, erosion and scour should be repaired with engineered fill compacted to the earthwork's specifications (see glossary)</p> <p>Check embankments for settlement, erosion, scouring, cracking, sloughing, separation, seepage, tomos, etc.</p>

3.3.2. Health and Safety Risks Associated with Emergency Spillway Maintenance

There are a number of health and safety risks associated with working around the spillway. Some of these potential risks are highlighted in Table 11 below.

Table 11. Health and safety risks associated with working around spillway

Risk	Mitigation
Deep water (i.e. deeper than knee depth)	Do not enter the water, have rescue rope and second person available.
Steep and slippery banks	Take care and avoid wet soil conditions.
Erosion, scouring of spillway	Do not access unstable spillway. Stay away from edge of erosion/failure.
Drop offs	Do not mow close to drop off at downstream shoulder of spillway.

3.4. Landscaping

The proposed basin has large areas of riparian vegetation surrounding them. This area is susceptible to weed growth, as well as the loss of desirable native plant species.

Pest plants can affect the basin’s vegetation by outcompeting desirable native species. Due to the large number of pest plant species, refer to the Hawke’s Bay Regional Council Pests and Weeds Hub Database (Hawke’s Bay Regional Council, n.d.) and the Hawke’s Bay Regional Pest Management Plan 2018-2038 (Hawke’s Bay Regional Council, 2018).

3.4.1. Routine Maintenance

Key routine maintenance actions are summarised in Table 12 below.

Table 12: Maintenance actions

Component	Recommended Action
Riparian Vegetation/Landscaping	<p>Vegetation maintenance works including staking, trimming, lawn mowing, weed control, and replacement planting (only during planting season). Inspect riparian plant health and any build-up of dead plant material. Remove debris as necessary. Replace unhealthy or dead planting and undergo ongoing maintenance until established. When new planting is being carried out, exposed soil should be protected with mulch or organic matting such as coconut fibre to prevent soil erosion. Maintenance intervals will vary with growth rates and seasons.</p> <p>Identify weeds. Hawke’s Bay Regional Council Pests and Weeds Hub Database (Hawke’s Bay Regional Council, n.d.). Notify the Hawke’s Bay Regional Council Biosecurity Team if pest species present 0800 108 838).</p> <p>Using appropriate control methods for the weed present, undertake weed control around the basin and in the wider property using a combination of mechanical control, manual removal and herbicide. Specialist to be contacted if further weed inspection and removal is required. Where soil erosion is observed, repair as necessary. Soil can be eroded from basin banks particularly after heavy rainfall and/or where vegetation cover is poor.</p>

3.4.2. Health and Safety Risks Associated with Landscaping

There are a number of health and safety risks associated with working around riparian vegetation. Some of these risks are highlighted in the Table 13 below.

Table 13. Health and safety risks associated with working around riparian vegetation

Risk	Mitigation
Steep and slippery banks	Take care and avoid wet soil conditions.
Unstable banks	Avoid standing on unstable banks
Stinging insects	Wear long sleeved clothing and take care during summer months.
Pollen/Dust	Wear respirator while mowing during summer.

3.5. Wildlife

The proposed Dry Basin will provide habitat for a large number of terrestrial and aquatic wildlife.

Mosquitos, pest animals such as rabbits, and stinging insects such as wasps can create health and safety hazards, which can negatively affect maintenance activities. For example, rabbit burrows can create a trip hazard for maintenance workers, or wasps can sting maintenance workers.

3.5.1. Routine Maintenance

Key routine maintenance actions identified for the basin wildlife are summarised in Table 14 below.

Table 14. Maintenance actions

Component	Recommended Action
Wildlife	Regular inspection is required to ensure that desirable species are not threatened, and pest species are controlled. Areas for mosquito controlling organisms (e.g. minnows) should be maintained. Infestation of rabbits or rodents should be dealt with by a suitably qualified professional. Avoid contact with insects, such as wasps. If nests are on site, seek a suitably qualified professional to remove nests.

3.5.2. Health and Safety

There are a number of health and safety risks associated with working around ecology. These risks are highlighted in the Table 15 below.

Table 15. Safety risks associated with working around ecology

Risk	Mitigation
Steep and slippery banks	Take care and avoid wet soil conditions.
Unstable banks	Avoid standing on unstable banks
Stinging insects	Wear long sleeved clothing and take care during summer months.
Pollen/Dust	Wear respirator while mowing during summer.

3.6. Access and Security

The Basin is located at the Northern end of the development. A concrete access track off Creek Road provides vehicular access to the basin. The access track for the basin is shown in Figure 2, and can be referred to in drawings P24-244-00-3850/54-DR.



Figure 2. Dry Basin Layout Plan

Maintenance track around the dry basin

- The maintenance track around the perimeter of the basin is proposed to be 4m wide and constructed of durable and permeable materials such as gravel. This minimises soil compaction and erosion around the basin and allows for ease of maintenance of the track itself. A ute or excavator can comfortably track around the maintenance track. The access points to the maintenance track (off the access track) have been designed to allow for tracking of an 8.3m AT Truck design vehicle.

Internal access

- Access to the internal parts of the basin can be made by foot along the middle island. This is 1m wide at 1% crossfall and could be used for maintenance access.

Basin outlet structure / scruff dome

- Access to the scruffy dome outlet can be made by foot from the maintenance track, walking over the shallow marsh, where the outlet has been placed at the edge of the outlet pool for ease of access.
- It is important that the access and maintenance track are regularly inspected and maintained for signs of erosion, damage, or excessive wear.

Emergency spillway

- Access can be made by parking a vehicle on the maintenance track at the entry point of the emergency spillway, and inspections made by foot along the spillway. Note that outflow channel from the emergency spillway is at a 14% grade.

GPT/Proprietary Device

- Drawing P24-244-00-3850 indicates where a vehicle can drive up to the GPT for maintenance activities. Alternatively, a vacuum truck could park on the maintenance track (location indicated on the drawing) and the suction pipe carried to the GPT for clearing out of the GPT. The distance to reach the GPT off the maintenance track is approximately 5.5m and easily reachable by foot. This method of accessing the GPT would be encouraged to minimise environmental impacts.

Outfall structure

- This is discussed in Section 3.

3.6.1. Routine Maintenance

Key routine maintenance actions identified for the basin maintenance access are summarised in Table 16 below.

Table 16. Maintenance actions

Component	Recommended Action
Maintenance Accessway	Vehicular access to basin, structural integrity, width sufficient for plant and machinery access. Check presence of weeds. Remove if present.
Fences/Handrails	Check condition of perimeter/safety fences and handrails.
Signage	Check signage for graffiti or damage

3.6.2. Health and Safety Risks

There are a number of health and safety risks associated with working around a waterbody. Some of these potential risks are highlighted in the Table 17 below

Table 17. Health and safety risks associated with working around access areas

Risk	Mitigation
Steep and slippery banks	Take care and avoid wet soil conditions.
Unstable banks	Avoid standing on unstable banks.
Public	Have a plan if an unwanted encounter occurs.

4.0 Dry Basin Operation & Maintenance Requirements

4.1. Inspection and Maintenance Activities

The following checklists are designed to be used for all maintenance inspections; The checklists are included in Appendix A. It is recommended that all tables are printed/filled out during all inspections (although only the annual inspection requires every item).

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Appendix A:

Maintenance Checklist

Effective long-term operation of the basin requires dedicated and routine maintenance tasks performed to a consistent timetable:

Maintenance Activity	Monthly	6 Monthly	12 Monthly	5 Yearly
Remove weeds and replace dead plants. Eradicate noxious/pest weeds and undesirable growth. This shall be completed by competent workmen who have landscape experience. A hoe and weed knife will be required and other weed removal equipment.	✓			
Litter removal. Litter removal will require low skilled workman. Equipment includes a pickup tool claw, rubbish bags and other equipment suitable for the removal of litter.	✓			
Inflow, overflow/outlets – check overflow for clogging. Remove accumulated sediment. Check overflow spillway. This will require specialist materials and competent labour.	✓			
Summer-monitor and water vegetation in extended dry periods. Low skilled labour and watering tools will be required.	✓			
Visually check for damage or missing components of devices Replace/fix as required. Workmen who are competent at identifying broken equipment will be required as well as a site checklist, and other equipment deemed appropriate.	✓			
Pruning or thinning. Low skilled labour and pruning tools are required and other equipment deemed appropriate.		✓		
Inspect trees and shrubs and replace any dead or severely diseased vegetation. A shovel, weed knife, hoe and other equipment deemed appropriate may be required to carry out work.		✓		
Scour/erosion evident: check for erosion signs. Check dams/capping system areas and correct as required. Labourers who are competent in checking for erosion are required and other equipment that are deemed appropriate for job may be required.		✓		
Outlet manholes – check and remove silt from manhole sumps. Competent Labourers and a sucker truck. Equipment that is deemed appropriate maybe required.		✓		

<p>Pre-treatment, inspection and silt removal as required. Low skilled labour is required and a sucker truck required. Equipment that is deemed appropriate maybe required.</p>		✓		
<p>Check for restrictions/clogging/failures in pipes. Competent workers and pipe work tools are required.</p>			✓	

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