Update to 2018 Landscape Management Plan

Stage 2 & 3 Lindfield Learning Village

For **Urbis Pty Ltd**

KLEINFELDER
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18 July, 2018

Attention: Alaine Roff
Urbis Pty Ltd
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Delivered by email: aroff@urbis.com.au

Updating the Lindfield Learning Village APZ Landscape Management Plan (LMP) to Support Development Stages 2 & 3 of SSD 8114

Overview

The Landscape Management Plan (LMP) for Phase 1 construction (Stage 1) and operation of a new school at the Lindfield Learning Village (LLV) has previously been prepared by Kleinfelder (LMP 2018) on behalf of the NSW Department of Education and School Infrastructure NSW (the Applicant).

On 24 October 2018 the Minister for Planning granted partial development consent to SSD 8114 for Phase 1 construction and operation of a new school for 350 students. The remainder of SSD 8114 (as originally proposed) has not yet been granted consent and has been subject to further investigation, assessment and engagement with the relevant agencies:

- NSW Department of Planning and Environment (DPE)
- New south Wales Rural Fire Service (RFS)
- Office of Environment and Heritage (OEH)
- Roads and Maritime Service (RMS)
- Teachers Federation NSW (Tf NSW)
- Ku-Ring-Gai Council.

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This letter determines the relevance of the 2018 LMP document relative to the Phase 2 (stages 2 and 3), being:

Phase 2(a) of construction:

- Minor internal works within the approved Phase 1 area to accommodate an additional 35 students.
- The additional 35 students (a total of 385 enrolled students) is needed for Day 1 Term 1 2020, prior to Phase 2(b) being completed.
- This Phase will occur immediately on approval to allow the additional students for Day 1 Term 1 2020. Phase 2(b) and Phase 3 will likely to be constructed at the same time.

Phase 2(b) of construction:

- Works to accommodate 1,050 students (including the approved 350).
- Repurposing of the Phase 1 area.
- A loop road around the southern portion of the site for emergency vehicles, buses and drop off and pick up vehicles.

Stage 3 of construction:

- Works to accommodate an additional 950 students in the western wing of the building.

Vegetation management will be required to achieve the necessary APZ. The SSD does not seek approval for vegetation management outside the site boundary. Any vegetation management outside the site boundary is subject to a separate approval under Part 5 of the EP&A Act issued by OEE&S.

Purpose

The purpose of this letter will be to demonstrate that the current Phase 1 LMP prepared in 2018 adequately supports the ongoing Phase 2 (Stages 2 and 3) with respect to land management works, monitoring and maintenance associated with Asset Protection Zone (APZ), weed management and soil erosion and sediment control. Phase 1 landscape management works for bushfire mitigation (vegetation modification for APZ) have been completed to the extent of the LLV site boundaries (confirmed completion January 2019).

The preparation of a separate Phase 2 LMP document is considered as repetitive and inconsequential, and the Phase 1 LMP will continue to satisfy the development application as long as the APZ is entirely contained within the site boundaries.

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Addendum to LMP

If any additional landscape management works are proposed for Stage 2 and 3 within the LLV site (other than ongoing monitoring and maintenance for APZ performance, weeds and sediment/erosion management), this LMP update will provide a summary of:

- What the additional works are for, and design plans
- A set of construction management actions to ensure the works satisfy the aims and objectives of the LMP
- Extend on the current LMP monitoring and maintenance schedule to capture the monitoring and maintenance requirements for the additional works.

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Addendum #1: Proposed Vegetated Swales and Bioretention Swales

The proponent has identified the stormwater and overland flow as construction matters that should considered for long term hydrology and pollution management (Water Sensitive Urban Design or WSUD), and which ultimately affect the landscape functionality. The construction management, monitoring and ongoing maintenance will form a part of the LMP.

The WSUD design would catch and filter as much water as possible on the southern portion of the LLV site, and will utilise the following deigns:

- Vegetated swales, with some deeper Bio retention-swales
- Rock depths will dictate the extent of deep vegetated swales and depths of bio retention basins
- Design should cater for 20,000L of volume when considered with the swales
- Vegetated swales vary from 0.8m width to 2m width
- Base of Bio retention swale is 0.5m width as a rule, overall width at surface about 1.5-2m
- There are small bio-retention basins throughout and subject to rock depth
- Works with the grading on site and the swales are designed to interact / interface with the fire trail
- Trail low points are noted and hence the start of the stormwater treatment train
- Slots in the kerbs to the south side allow for water to enter the bio retention swale.
- Bio retention pit locations can feed in to the road side swale
- Planting would be in groups a few metres apart to comply with bushfire performance criteria for APZ.

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How Does the Proposed Vegetated Swales and Bioretention Swales meet the Aims and Objectives of the LMP

The primary aim of the LMP is to provide a working document that will outline the actions and procedures required to:

- To identify trees to be removed or retained to ensure the APZ will meet the performance criteria set out under NSW RFS published documentation for APZ management (Standards for Asset Protection Zones, 2005);
- To provide a flexible data set to assist in ongoing planning and construction throughout the study area;
- While achieving the above, optimise the ecological functionality of the APZ and surrounding native vegetation areas, both during development and into perpetuity;
- Consider weed management;
- Consider threatened species interactions and management;
- Be consistent with the requirements of the Ku-Ring-Gai Council Local Environmental Plan (2015);
- Provide a works schedule to ensure the site meets its performance criteria in perpetuity.

The proposed WSUD to manage the stormwater and overland flow will consider the existing status within the LLV APZ area in its design, and:

- Will meet the performance criteria set out under NSW RFS published documentation for APZ management;
- Will avoid impact to retained trees, and optimise ecological functionality of the APZ and surrounding native vegetation in perpetuity;
- Will continue to manage weed and erosion sedimentation issues;
- Will consider fauna species interaction management during construction;
- Will be supported with a works, monitoring and maintenance schedule to ensure the site meets its performance criteria in perpetuity

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The vegetation swales and bio retention swales will be constructed on land previously managed for APZ and currently maintained and monitored under the LMP 2018 Appendix 4 Landscape and Fuel Monitoring Data Sheet. No further clearing of trees will be required, and root zones will be protected from construction disturbance.

The area proposed for the swales currently meets APZ standards and will continue to meet these standards, inclusive of the planted vegetation within the swales.

Table 1 of this Addendum letter details management actions specific the construction of the proposed swales and relate to the LMP. These actions should be followed during construction.

The Addendum 1 Landscape and Fuel Monitoring Data Sheet (attached in this document) has the current and approved LMP landscape elements that will be monitored to detailed the performance criteria every September and once again before January (or as required) and includes the monitoring and maintenance associated with the proposed swales construction.

Based on the proposed swales being approved, this Addendum 1 Landscape and Fuel Monitoring Data Sheet would supersede the current and approved LMP 2018 Appendix 4 Landscape and Fuel Monitoring Data Sheet.

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Table 1: Vegetated Swales and Bio Retention Swales Construction Management Actions, Timing and Performance Criteria

Item	Action	Performance criteria	Timing/ Duration	Responsibility
1.	Swale design and construction zones to be surveyed and delineated	Surveyed delineation devices (e.g. pegs, barrier tape) are in place at reasonable intervals. No tree removal or construction within 'drip line' of retained trees. No works outside the approved and delineated swales construction areas	Prior to any construction	Project Construction Manager
2.	Erosion and sediment control plans prepared and enacted	Suitable Erosion and Sediment Control Plan prepared specific for the swales construction. Erosion and sediment controls are in place. No erosion or sediment deposit will occur throughout the construction of the swales.	Prior to any construction During construction	Project Construction Manager
3.	Swales to be landscaped with suitable top soils, native species (preferably) and a ground cover (turf) to stabilise	Plants and turf are in a healthy condition. Swales are free of weeds (refer to landscape architects plans). Vegetation in swales is not over-grown and potentially increases a fire hazard (turf can be mown to 10cm on regular basis/ landscaped swales will be managed to remove dead material) Swales are free of built-up vegetation which has capacity to alter or obstruct the flow within the swales. Swales are free of litter and rubbish.	Landscaping phase	Project Construction Manager Landscape Architect Landscape contractor
4.	Ongoing monitoring	Swales are monitored on the same frequency as the LMP, and has been detailed in the updated Landscape and Fuel management Data Sheet	September and January.	Landscape contractor
5.	Ongoing maintenance	A summary of all works required will be delivered post monitoring.	September and January.	Landscape contractor

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ADDENDUM 1 LANDSCAPE AND FUEL MONITORING DATASHEET (UPDATED)

This data sheet provides an annual (or as required) account of the landscape and vegetation retention and fuel loading elements across the Lindfield Learning Village APZ area.

Each monitoring event will record the performance and recommend actions for any element not meeting the performance. The completion will be recorded after recommendations have been actioned.

Date:	Name: Company

Monitoring Data

APZ Landscape Element	Performance Criteria	Recommended Action	Completed Action (Y/N)
Retained tree health	Designated and numbered trees (228) remain in place. Expect there may be some tree mortality and succession. Dead trees to be recorded and be replaced by same species (seedling). Dangerous limbs to be recorded and removed by arborist.		
APZ – tree canopy	Minimum 2-5m separation between tree canopies or clumps. Where canopy connection creates a link between canopies or clumps, separation will be required using arborist to prune limbs. Maximum 15% canopy cover within the APZ.		
APZ - ground fuel loads	Ground fuels managed to 100mm height (fine fuels associated with grasses, shrubs, sedges etc.). Managed through slashing, mowing or brushcutting prior to the bushfire	October:	

APZ Landscape Element	Performance Criteria	Recommended Action	Completed Action (Y/N)
	season (before October annually). Monitoring of ground fuels to be conducted in January, prior to school year commencing.	January:	
Vegetation impact on pathways	Vegetation obstructions on pathways to be kept clear of pedestrians. Tree pruning as required to achieve 2-3m height clearance and 1-2m cleared width from pathways.		
Erosion and sediment deposit	No active erosion or sedimentation on the APZ within LLV site. Any identified areas of sediment erosion or deposition will be recorded.		
Vegetation impact on fire hydrants	All fire hydrants will be clear of obstruction for a minimum distance of 1m (such as storage material, trees and shrubby vegetation etc). All hydrants to be confirmed.		
Fire trail standard	The fire trail will meet minimum specifications as detailed in LMP Section 2.3.1		
Vegetation impact on fencing	School fencing will have a minimum 1m separation (height and width) from standing vegetation (2m wide corridor clear of trees and shrubs). Tree pruning by arborist may be required.		
Vegetated Swales and Bio Retention Basin Management	Vegetated and bio retention swales are free of obstruction and allow for free flow and drainage (clear of litter) Vegetation within swales are living and in healthy condition and contained within the swale zone. Swales are free of weeds. No erosion and sedimentation associated with the swale constructions (i.e. stabilised soils) No sediment or litter deposited offsite from the LLV. No direct overland water flow off site, but continued seepage over long periods of time acceptable.		

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PROPOSED SWALE CONSTRUCTION FOR LLV

NO BIORETENTION OR WSUD PROPOSED FOR THIS AREA.

20m³ - 20,000L.

DEMOLITION EXCLUSION ZONE
COLA

BIO RETENTION BASIN. (LOW POINT)

BIORETENTION BASIN (PREDOMINANTLY SURFACE WATER).

OPTIONAL LEVELLER SWALE HERE.

SWALE INTERACTION WITH PAVEMENT

RETAINING WALL.

VEGETATED SWALE 0.8 - 2m WIDTH x 150mm TO 350mm DEPTH.
OR.
BIORETENTION SWALE 0.

APPROXIMATE TOP OF ROCK CLIFF EDGE

INACCESSIBLE TO SURVEY

NO BIORETENTION OR WSUD PROPOSED FOR THIS AREA.

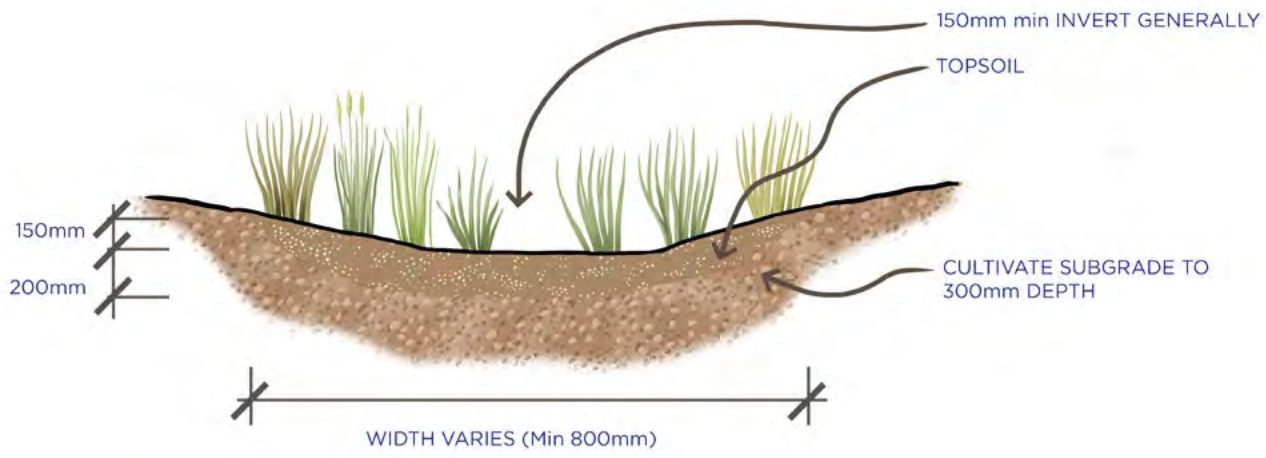
3.4.1. Vegetated swales (table drains)

Vegetated swales are linear features that convey stormwater along the surface within a wide, shallow channel, typically at gentle grades (<5%). The linear form of swales makes them ideally suited to a linear environment in both rural and urban areas, as well as locations without defined drainage systems. Vegetated swales are generally used as a primary treatment device at the upper end of the treatment train, however can be used as the sole treatment element. Vegetation is used to promote uniform flow and also the slowing of water velocity to encourage the settlement of course sediments and also capture significant amount of litter and organic matter.

Vegetated Swales are generally compatible with adjacent project corridors, however vehicle traversability, maintenance safety and water conveyance objectives must be considered during design. Some protection may be required from vehicle damage if deemed to be a risk. Whilst swales require additional land in comparison to piped drainage systems, they may also be used as a boundary defining feature, and be part of the landscape design.

Vegetated Swales have limited effectiveness removing fine sediment, nutrient and heavy metal removal due to their generally short detention times during large storm events.

Whilst vegetated swales can have a low construction cost in comparison to piped drainage systems, high initial maintenance will be required during establishment of the vegetation, with ongoing periodic monitoring for vegetation cover, and infrequent mowing and litter removal. Vegetation should be selected based on local climate and rainfall regime, sufficient density, and be maintained at a height above the treatment flow level to maximise filtration. Vegetated swales work most efficiently with distribution of flow along the swale from the catchment edge. Concentrated flows at a single entry point can lead to overwhelming of the vegetation and erosion.



VEGETATED SWALE

3.4.2. Bioretention swales

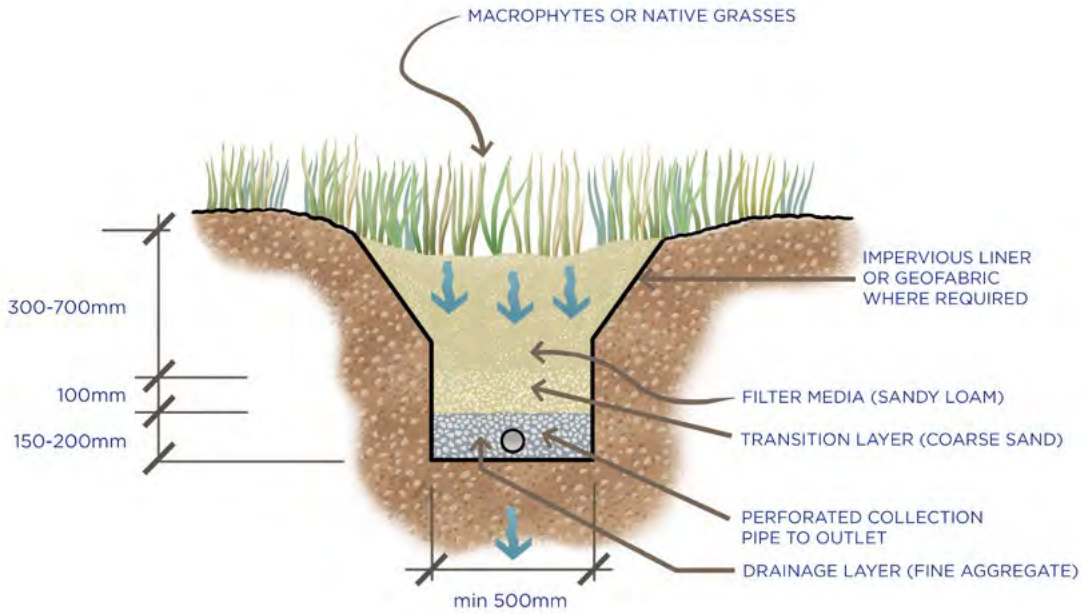
Bioretention swales (or Bioretention trenches) are linear systems that include a vegetated swale and subsurface filter. These swales provide a surface conveyance function as well as efficient treatment of stormwater through fine filtration, extended detention and some biological uptake.

Bioretention swales provide primary and secondary treatment of stormwater. The filter media and vegetation that grows in it absorbs pollutants, improving the element's effectiveness. Vegetation that grows in the filter media improves the function of the system in a number of ways. Erosion and clogging of the surface and filter media is limited by continuous plant growth. Plant roots and filter media also allow biofilms to form which pollutants will adsorb to.

The safety considerations for bioretention swales are quite similar to those of vegetated swales with particular attention to the trafficable nature of the swale when constructed in such areas where this may be a risk. They are suited to highly urbanised areas within metropolitan and rural centres incorporated as a boundary defining feature, landscape element or if relevant located within medians of roads, depots or car parks.

Bioretention swales have a comparable construction cost to piped systems, usually requiring very little maintenance. It is important in that they are properly sized and vegetated. In the event that the filter material becomes compacted or blocked, replacement of both the vegetation and filter material will be required. Removal of litter and organic matter may be required if they are placed in high litter load areas.

Design of bioretention swales must consider the potential for infiltrated stormwater to impact on surrounding infrastructure which can be avoided by using such techniques as installing an impervious membrane across the shared boundary with the element and/or having them installed with a slotted pipe at the base to convey any excess water.



BIORETENTION SWALE