

Design Opportunities and Considerations Report

Kent Street Sand Pit

Project No: EP20-055(03)

**Prepared for Town of Victoria Park
November 2020**



Design Opportunities and Considerations Report

Kent Street Sand Pit



Document Control

Doc name:	Design Opportunities and Considerations Report Kent Street Sand Pit				
Doc no.:	EP20-055(03)--001C TAA				
Version	Date	Author		Reviewer	
1	July 2020	Rachel Weber	RAW	Tom Atkinson	TAA
	Report prepared for client review				
A	September 2020	Tom Atkinson	TAA	Rachel Weber	RAW
	Updated following comments from Town of Victoria Park				
B	October 2020	Tom Atkinson	TAA	Rachel Weber	RAW
	Updated following comments from the Friends of Jirdarup Bushland and Town of Victoria Park				
C	November 2020	Tom Atkinson	TAA	Rachel Weber	RAW
	Updated following comments from the Friends of Jirdarup Bushland and Town of Victoria Park				

© 2020 Emerge Associates All Rights Reserved. Copyright in the whole and every part of this document belongs to Emerge Associates and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person without the prior written consent of Emerge Associates.

Design Opportunities and Considerations Report

Kent Street Sand Pit



Executive Summary

The Town of Victoria Park plan to rehabilitate the Kent Street Sand Pit which comprises part of Lot 705 Kent Street in Kensington (the 'site').

This report provides information on design options for rehabilitation of the site to inform future landscape planning, detailed design and project management.

The site is zoned for parks and recreation under the Metropolitan Region Scheme (MRS) and, due to the sites' history as a landfill site, is classified as 'remediated for restricted use' under the *Contaminated Sites Act 2003*. These considerations limit the options for redevelopment of the site.

Fortunately, the previous decisions of the Town of Victoria Park Council, consultation with the Town of Victoria Park representatives and key local stakeholder the Friends of Jirdarup Bushland, strongly indicated a preference for the establishment of a relatively informal, conservation-oriented area of public open space within the site. Overarching goals include revegetation of the site with native plants, establishment of paths to facilitate public access and integrating the site with the broader Jirdarup Bushland Precinct. Additional features to enhance amenity and experience are also proposed to add public amenity value.

While the *Site Management Plan* prepared as part of the contamination investigation and reclassification of the site does not preclude excavation a presumption is made that excavation be avoided and fill imported where features require depth of footing. Most paths and features proposed should be able to be constructed without the need to cut into the soil profile. Planting native tubestock into the upper soil profile is considered appropriate as long as the specific requirements of the *Site Management Plan* are adhered to.

Generally, the revegetation of the site will require consideration of weed control and supplementary watering.

Further community consultation is expected to be completed as part of future landscape planning and detailed design for the site.

Funding requirements and sources will require further investigation.

A preliminary delivery program is recommended that relies on a combination of Town of Victoria Park and external contractor contributions.

Design Opportunities and Considerations Report

Kent Street Sand Pit



This page has been left blank intentionally.

Design Opportunities and Considerations Report

Kent Street Sand Pit



Table of Contents

1	Introduction	2
1.1	Project background	2
1.2	Purpose and scope of work.....	2
2	Site Background.....	3
2.1	Planning context	3
2.1.1	Land use history	3
2.1.2	Contamination	5
2.1.3	Zoning.....	6
2.1.4	Bush Forever	6
2.1.5	Strategic context	6
2.2	Environmental context	8
2.2.1	Topography	8
2.2.2	Geomorphology and soils	8
2.2.3	Hydrology and wetlands	8
2.2.4	Vegetation.....	8
2.2.5	Conservation significant flora and fauna	10
2.2.6	Conservation significant ecological communities	10
2.2.7	Weeds	11
3	Opportunities and Considerations.....	12
4	Landscape Concept	15
5	Recommendations.....	17
5.1	Site preparation	17
5.1.1	Paths.....	17
5.1.2	Perimeter Fencing	17
5.1.3	Construction/ installation	17
5.1.4	Weed control	17
5.1.5	Native plant establishment	19
5.2	Environmental considerations	19
5.2.1	Climate	19
5.2.2	Soils	20
5.2.3	Fauna habitat retention and creation	20
5.3	Community engagement	20
5.4	Funding	20
5.5	Staging and delivery.....	21
6	References	22
6.1	General references	22

List of Tables

Table 1: Opportunities assessment.....	13
Table 2: Considerations assessment	14

Design Opportunities and Considerations Report

Kent Street Sand Pit



List of Plates

Plate 1: Historical aerial image 1953 (WALIA 2020).....	3
Plate 2: Historical aerial image 1981 (WALIA 2020).....	4
Plate 3: Historical aerial image 2000 (WALIA 2020).....	4
Plate 4: Historical aerial image 2006 (WALIA 2020).....	5
Plate 5: Jirdarup Bushland Precinct from the Town’s Public Open Space Strategy (UDLA 2019)	7
Plate 6: Native vegetation on the margins of the site.....	9
Plate 7: Predominantly non-native vegetation across the majority of the site	10
Plate 8: Example ‘woody’ weeds including Melia azedarach (white cedar)	18
Plate 9: Example ‘grass and herb’ weeds including perennial grasses Cynodon dactylon (couch) and Cenchrus clandestinus (kikuyu)	19

Figures

- Figure 1: Site Map
Figure 2: Bush Forever Site 48

Appendices

Appendix A

Kent St Sand Pit Opportunities and Considerations

Appendix B

Kent St Sand Pit Landscape Design

Appendix C

Kent St Sand Pit Opinion of Probable Costs

Design Opportunities and Considerations Report

Kent Street Sand Pit



Abbreviation Tables

Table A1: Abbreviations – Organisations

Organisations	
DBCA	Department of Biodiversity, Conservation and Attractions
DWER	Department of Water and Environmental Regulation
WAPC	Western Australia Planning Commission

Table A2: Abbreviations – General terms

General terms	
PEC	Priority ecological community
TEC	Threatened ecological community

Table A3: Abbreviations – Legislation

Legislation	
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i>
EP Act	<i>Environmental Protection Act 1986</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
BC Act	<i>Biodiversity Conservation Act 2016</i>

Table A4: Abbreviations – planning

Planning terms	
MRS	Metropolitan region scheme
TPS	Town planning scheme

Table A5: Abbreviations – units of measurement

Units of measurement	
cm	Centimetre
ha	Hectare
m	Metre
m ²	Square metre
m AHD	m in relation to the Australian height datum
mm	Millimetre

Design Opportunities and Considerations Report

Kent Street Sand Pit



This page has been left blank intentionally.

Design Opportunities and Considerations Report

Kent Street Sand Pit



1 Introduction

1.1 Project background

The Town of Victoria Park (the 'Town') plan to rehabilitate the Kent Street Sand Pit which comprises part of Lot 705 Kent Street in Kensington (the 'site').

The site is leased and managed by the Town and is currently zoned 'parks and recreation' under the provisions of *Town Planning Scheme No.1* (TPS1) and *Draft Local Planning Strategy*.

The site is approximately 4.33 hectares (ha) in size and is bound by Kent Street to the south east, remnant bushland associated with Bush Forever Site No. 48 adjacent to Baron-Hay Court to the south west, Kensington Bushland north west and north east.

The location and extent of the site is shown in **Figure 1**.

1.2 Purpose and scope of work

Emerge Associates (Emerge) were engaged by the Town to assist in preparing a 'design opportunities and considerations report' for the site.

The purpose of this report is to provide information on suitable design options for rehabilitation of the site to inform future landscape planning and project management as previously proposed under the Town's *Public Open Space Strategy* (UDLA 2019).

The scope of work was specifically to prepare a report with recommended option(s) that:

- was consistent the site's zoning as a 'parks and recreation' reserve under the provisions of *Town Planning Scheme No.1*
- considered past recommendations and decisions made in relation to the site
- explored opportunities for enhancing the experience of adjacent Kensington Bushland to strengthen the connection between the community and the environment
- contained sufficient detail to guide future stages of planning and implementation.

Design Opportunities and Considerations Report

Kent Street Sand Pit



2 Site Background

2.1 Planning context

2.1.1 Land use history

The history of the site is not particularly well documented. However, from review of historical aerial imagery (WALIA 2020) and previous survey reports (OTEK 2009; AECOM 2012; SERS 2015), the site has been used as a source of sand, a domestic landfill and storage area for building materials, construction and road sweeping waste, vehicle washing and as a discharge area for run off.

Part of the site was cleared of native vegetation by 1953 (**Plate 1**). From that time until approximately 1980 the entire site was progressively cleared and utilized for sand extraction based on aerial imagery (**Plate 2**). SERS (2015) report that the site was used as a landfill from the mid-60s until 1992. Based on aerial imagery progressive filling of the site did not seem to occur significantly until after 1981 and had been completed to current day levels between 2000 and 2006 (**Plate 3** and **Plate 4**). According to site investigations, filling was primarily achieved through receipt of building waste, with smaller portion of domestic waste and then overlain with uncontrolled fill sand (SERS 2015). Parts of the site were also excavated or left unfilled so as to form shallow basins to receive stormwater from the surrounding road network. The site has had no active use since it was filled, remaining vacant and fallow.



Plate 1: Historical aerial image 1953 (WALIA 2020)

Design Opportunities and Considerations Report

Kent Street Sand Pit



Plate 2: Historical aerial image 1981 (WALIA 2020)



Plate 3: Historical aerial image 2000 (WALIA 2020)

Design Opportunities and Considerations Report

Kent Street Sand Pit



Plate 4: Historical aerial image 2006 (WALIA 2020)

2.1.2 Contamination

As a consequence of landfill activities, the site was classified by the Department of Water and Environmental Regulation (DWER) under the *Contaminated Sites Act 2003* as ‘possibly contaminated – investigation required’ on 3 September 2012 following investigation completed by OTEK (2009).

Subsequent detailed site investigations by AECOM (2012) and SERS (2015) characterised the fill as largely comprising building materials, bricks, concrete, blue metal, limestone and pea gravel. Intact and non-friable fragments of asbestos containing material (ACM) were recorded as buried and scattered on the ground surface in the northern corner of the site. Otherwise the investigations did not identify elevated contaminants in soils. Elevated copper, zinc, benzene and TPH were identified in groundwater beneath the site. However, groundwater contamination was not considered to pose any risk to human health (SERS 2015). Elevated levels of carbon dioxide were also identified in soil profile (ground gas).

In June 2017 the Department of Water Environmental Regulation (DWER) reclassified the site to ‘remediated for restricted use’ subject to implementation of the *Site Management Plan* (SERS 2017). Under the *Contaminated Sites Act 2003* this classification was applied to convey the site is considered suitable for passive recreational use.

Key requirements of the *Site Management Plan* include:

- site management and work control procedures for ACM ground water and ground gas
- periodic inspection and review (SERS 2017).

Design Opportunities and Considerations Report

Kent Street Sand Pit



2.1.3 Zoning

Under the *Metropolitan Region Scheme* (MRS), approval by the Western Australian Planning Commission (WAPC) is required for any development on land reserved for 'parks and recreation'. The WAPC's *Development Control Policy 5.3: Use of Land Reserved for Parks and Recreation and Regional Open Space* (DC 5.3) states that land reserved for parks and recreation may be used for:

- passive recreation
- active sporting pursuits
- cultural and or community activities
- activities promoting community education of the environment uses that are compatible with and or support the amenity of the reservation where specific facilities for such purposes have been approved by the WAPC.

2.1.4 Bush Forever

The Government of Western Australia's *Bush Forever* policy is a strategic plan for conserving regionally significant bushland within the Swan Coastal Plain portion of the Perth Metropolitan Region. The objective of *Bush Forever* is to protect comprehensive representations of native vegetation (Government of WA 2000). *Bush Forever* sites are representative of regional ecosystems and habitat and have a key role in the conservation of Perth's biodiversity.

Bush Forever Site No. 48 (Kensington Bushland) intersects the site as shown in **Figure 2**.

2.1.5 Strategic context

A range of documents, recommendations and Council decisions have led to proposal to rehabilitate the site.

Minutes of the Town of Victoria Park Ordinary Council Meeting on 11/07/2000 under '2.5 Kent Street Sandpit Usage' state "... and the preliminary plans discussed at the Councillors Workshop on March 30 1999 regarding the development of the Kent Street sand pit for predominantly passive recreational and cultural use."

In August 2015 the Town of Victoria Park Council resolved to merge the site with the Kensington Bushland Reserve and George Street Reserve into an area known as the Jirdarup Bushland Precinct (UDLA 2019)(refer **Plate 5**). The creation of the Jirdarup Bushland Precinct recognises the fact that these three areas do not function independently from each other, and that they are all linked to provide a valuable natural asset that needs to be protected. Implicit in this resolution was that the site should be rehabilitated as a conservation area and managed in a similar way to the other two reserves within the Jirdarup Bushland Precinct.

Design Opportunities and Considerations Report

Kent Street Sand Pit



Plate 5: Jirdarup Bushland Precinct from the Town's Public Open Space Strategy (UDLA 2019)

The site, which forms part of the Jirdarup Bushland Precinct, is mapped as having a passive function in the Town's *Public Open Space Strategy* and is the subject of Council resolutions committing to a future environmental and bushland function (UDLA 2019). The *Public Open Space Strategy* identifies the sandpit area as future POS but notes that it comprises a former quarry site which is not considered to be usable public open space without future works such as rehabilitation (UDLA 2019).

The *Bentley-Curtin Specialised Activity Centre Plan* places the site within 'bushland' character zone (DPLH 2018). Contrasting to other documents, the *Bentley-Curtin Specialised Activity Centre Plan* identifies the former sandpit site as a potential infrastructure location for a future rapid transit, light rail network (DPLH 2018). It is understood that there is no active discussion between the State government and the Town regarding use of the site in this way.

The Town's *Urban Forest Strategy* identifies the Jirdarup Bushland Precinct as regionally significant and the sand pit site is seen as a key opportunity for increasing urban canopy within Victoria Park (Town of Victoria Park 2018). The *Urban Forest Strategy* also proposed that establishing an 'environmental resource centre' at the site or another suitable site be investigated (Town of Victoria Park 2018). An environmental resource centre was proposed to be located at the Kent Street sand quarry site by the Friends of Kensington Bushland circa 1999.

Design Opportunities and Considerations Report

Kent Street Sand Pit



2.2 Environmental context

2.2.1 Topography

The elevation of the site ranges from 14 m in relation to the Australian height datum (mAHD) in the centre of the site to 20 mAHD on the southern side of the site (AECOM 2012).

2.2.2 Geomorphology and soils

The site occurs on the Swan Coastal Plain, which is the geomorphic unit that characterises much of the Perth metropolitan area. Soil mapping by Gozzard (2011) also places the site in Bassendean sand (S8) which are typically very light grey at surface, yellow at depth, fine to medium-grained, sub-rounded quartz, moderately well sorted of eolian origin (Purdie *et al.* 2004).

In addition to natural soils the central parts of the site contain a layer of fill consisting of brown fine to medium grained sandy material with building materials throughout including fragments of bricks and concrete, gravels of blue metal, limestone and pea gravel (AECOM 2012).

2.2.3 Hydrology and wetlands

Wetlands include “areas of seasonally, intermittently or permanently waterlogged soils or inundated land, whether natural or otherwise, fresh and saline, e.g. waterlogged soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries” (Wetlands Advisory Committee 1977). Wetlands can further be recognised by the presence of vegetation associated with waterlogging or the presence of hydric soils such as peat, peaty sand or carbonate mud (Hill *et al.* 1996).

Examination of the Department of Water and Environmental Regulation (DWER) hydrography dataset (DWER 2018) shows no mapped wetland or water related features occur within the site.

The site is principally a terrestrial landform. Two excavated areas that function as stormwater basins occur within the site that may function as seasonal wetlands to some extent (SERS 2017). However, during previous investigations these basins have consistently been dry and it is unknown whether they have a hydrology consistent with their classification as wetlands.

2.2.4 Vegetation

Native vegetation is described and mapped at different scales in order to illustrate patterns in its distribution. At a continental scale the *Interim Biogeographic Regionalisation of Australia* (IBRA) divides the Swan Coastal Plain into two floristic subregions (Environment Australia 2000). The site is contained within the ‘SWA02’ or Perth subregion, which is characterised as mainly supporting *Banksia* low woodland on leached sands with *Melaleuca* swamps where ill-drained; and woodland of *Eucalyptus gomphocephala* (tuart), *E. marginata* (jarrah) and *Corymbia calophylla* (marri) on less leached soils (Beard 1990). This subregion is recognised as a biodiversity hotspot and contains a wide variety of endemic flora and vegetation types.

Variations in native vegetation can be further classified based on regional vegetation associations. Beard *et al.* (2013) places the site within ‘Bassendean_1001’ association which is described as ‘low forest, woodland or low woodland with scattered trees’ of ‘*Eucalyptus marginata*, *Banksia* spp., *Allocasuarina* spp.’ The adjacent Kensington Bushland provides a perfect local reference for this

Design Opportunities and Considerations Report

Kent Street Sand Pit

vegetation association as it would have once occurred within the site (prior to the sites' use as sand pit and landfill).

The site currently contains only small areas of native woodland vegetation around its margins where native plants were retained or have regrown on the batters of the sand pit (**Plate 5**). The center of the site contains predominantly non-native vegetation comprising non-native trees and shrubs over non-native grasses and herbs (**Plate 6**). The south eastern boundary contains a mix of native and non-native plants that have regrown or been planted following works within the site and the adjacent Kent St road reserve along the south east boundary of the site since the late 1980s.

The embankment area of the sandpit was revegetated from Kensington Bushland provenance stock over 3 years from 2012 to 2014. Anecdotally survival rates for planted stock were greatest on the Kent Street side along the south east boundary of the site, where the shallow underlying soils are yellow sands.



Plate 6: Native vegetation on the margins of the site

Design Opportunities and Considerations Report

Kent Street Sand Pit



Plate 7: Predominantly non-native vegetation across the majority of the site

2.2.5 Conservation significant flora and fauna

Plants and animals that are considered to be rare or under threat warrant special protection under Commonwealth and/or State legislation. At a Commonwealth level, species may be listed as 'threatened' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Any action likely to have a significant impact on a taxon listed under the EPBC Act requires Ministerial approval.

In Western Australia species may also be classed as 'threatened' under the *Biodiversity Conservation Act 2016* (BC Act). It is an offence to 'take' or 'disturb' threatened flora listed under the BC Act without Ministerial approval.

Plants or animals that do not currently meet the criteria for listing as threatened but are potentially rare or threatened may be added to the Department of Biodiversity Conservation and Attractions' (DBCA) priority lists. Although not under direct statutory protection, priority species are considered during State approval processes.

The site is unlikely to currently provide important habitat for threatened or priority flora species. Native vegetation at the margin of the site and within adjacent Kensington Bushland Reserve, non-native pine trees within the site and a lesser extent non-native eucalypt trees within the site may provide foraging resource for threatened species of cockatoo and in particular Carnaby's cockatoo.

2.2.6 Conservation significant ecological communities

An ecological community is a naturally occurring group of native plants, animals and other organisms that are interacting in a unique habitat. 'Threatened ecological communities' (TECs) are ecological communities that are recognised as rare or under threat and therefore warrant special protection.

Design Opportunities and Considerations Report

Kent Street Sand Pit



Selected TECs are afforded statutory protection at a Commonwealth level under the EPBC Act. Similar to flora species, TECs listed under the EPBC Act are assigned a conservation status. Any action likely to have a significant impact on a community listed under the EPBC Act requires Ministerial approval.

A plant community that is under consideration for listing as a TEC in Western Australia, but does not yet meet survey criteria or has not been adequately defined, may be listed as a 'priority ecological community' (PEC). Listing as a PEC is similarly considered during State approval processes.

Native vegetation on the perimeter of the site and within adjacent Kensington Bushland Reserve represents the EPBC Act listed 'banksia woodland of the Swan Coastal Plain' TEC which is also a State listed PEC.

2.2.7 Weeds

Due to historical land uses a wide variety of weed species are present within the site. The term 'weed' can refer to any plant that, anthropocentrically, is considered to be growing in the wrong place and so may require some form of management to reduce its effect on the economy, the environment, human health or amenity (Arcioni 2004). Many non-native flora species and some native species are considered to be weeds.

Design Opportunities and Considerations Report

Kent Street Sand Pit



3 Opportunities and Considerations

Opportunities and considerations relevant to the redevelopment of the site were determined from review of background information including previous decisions of Council (refer **Section 2**) and consultation with Friends of Jirdarup Bushland and representatives of the Town.

Consultation with Friends of Jirdarup Bushland commenced on Saturday 13 June 2020 at the club rooms at Harold Rossiter Park and comprised an informal and interactive workshop wherein the site constraints and opportunities were discussed and preferred design options identified. Consultation with representatives of the Town was completed on Thursday 18 June 2020 and video conference over MS Teams where the site constraints and opportunities and design options were further discussed.

Primarily the opportunities that were identified centred around revegetation of the site with native plants and establishment of paths to facilitate public access, support conservation objectives and integrate the site with the rest of the Jirdarup Bushland Precinct. The Friends of Jirdarup Bushland's vision for the site is essentially to restore native banksia woodland for "cockatoos, community and conservation". The importance of an opportunity to restore a relatively large area of banksia woodland within an urban part of the Perth metropolitan area is in particular highlighted by the friend's group.

Additional features to enhance amenity and heighten interactive experiences within the restored bushland were then suggested to add value to the designed outcome. It is also noted that this site has the potential to be the key location for indigenous cultural exchange in the Town of Victoria Park. With regards to the education centre option (previously outlined in **Section 2.1.5**), the current Friends of Jirdarup Bushland group has indicated a preference that such a centre be located outside of the site (that is not within the sand pit area).

Considerations which may include constraints or aspects that may need to be accommodated in the future generally include the following:

- The site's zoning as parks and recreation.
- The site's classification under the *Contaminated Sites Act 2003* as remediated for restricted use and associated limitations posed by the *Site Management Plan (SERS 2017)*.
- Variability in soil conditions across the site due to historical landuse.
- Lack of water supply within the site to facilitate revegetation.
- Legislated protection of native banksia woodland vegetation surrounding the site.
- Weed infestation within the site that may limit revegetation.
- The necessity to create safe public spaces.

While the sites zoning allows for active sporting use, there is no intention to infrastructure that supports such uses catered for within the site.

Note that the site's zoning and contaminated site classification do not preclude the construction of certain types of buildings or excavation. However, as these activities were not identified as a priority by stakeholders a presumption against the construction of buildings or deep excavation has been accepted to guide the scope of future works. Excavation can nonetheless be safely undertaken in line

Design Opportunities and Considerations Report

Kent Street Sand Pit



with the requirements of the *Site Management Plan* if required to facilitate the installation of minor structures such as shelters, bench seats or signage, or the removal of bitumen hardstand or other site components, as required.

A summary of opportunities is provided in **Table 1** and summary of considerations is provided in **Table 2**.

Opportunities and considerations are illustrated on plan provided as **Appendix A**.

Table 1: Opportunities assessment

Item	Details	
1	Bushland restoration	With the goal to integrate the site with the Jirdarup Bushland Precinct.
2	Urban forest creation	Existing trees retained (mostly), new trees planted providing a significant opportunity for the Town to increase canopy.
3	Passive recreation	Focus on local community, walkers / dog walkers, appreciation of nature. Opportunities for interactive experiences within the restored bushland.
4	Local access	Interconnected path network across Jirdarup Bushland Precinct.
5	Fauna habitat creation / enhancement	Black cockatoo foraging habitat, rainbow bee-eater habitat, understorey habitat for lizards, quenda, bird watering points, insect hotels.
6	Education	Meeting areas, signage. Interactive experiences within the restored bushland. Potential key location in the town for indigenous cultural exchange. The existing club house buildings at Harold Rossiter reserve may provide environment resource centre function in combination with features proposed in the site.

Design Opportunities and Considerations Report

Kent Street Sand Pit



Table 2: Considerations assessment

Item		Details
1	Zoning	Zoning limits potential use to: <ul style="list-style-type: none"> passive recreation active sporting pursuits cultural and or community activities activities promoting community education. Note there is no intention to include opportunities for active sporting pursuits within the site.
2	Contamination	Remediated for restricted use means it is suitable for passive recreational use, subject to implementation of the <i>Site Management Plan</i> (SERS 2017).
3	Stormwater	Existing basins are connected to local stormwater network and may need to be retained. In particular, the larger basin in centre of site will require modification in order to ensure public safety and enhance amenity once access to the site is permitted.
4	Bushland restoration	Modified soils and entrenched weed populations may limit short to medium term restoration outcomes. Current knowledge and restoration techniques cannot guarantee restoration of banksia woodland ecosystem. That is, it may not be feasible to recreate banksia woodland within the site as it occurs within adjacent Kensington Bushland over short timeframes. However, commencing restoration will in the very least act to extend, buffer and integrate the site to adjacent areas of remnant bushland.
5	Antisocial behaviour	Important that spaces do not encourage antisocial behaviour.
6	Irrigation	The site does not have a water source and requires that water cannot be drawn from surficial aquifer below the site (<i>Site Management Plan</i> (SERS 2017)).
7	Residual bitumen / hard stand	Small areas of bitumen hardstand could limit revegetation outcomes Where they occur. Removal or covering with imported fill may be considered to lessen potential influence of residual hardstand.
8	Weeds	Two broad categories of weeds occur in site that require control to facilitate restoration: 'woody' and 'grass and herb'.

Design Opportunities and Considerations Report

Kent Street Sand Pit



4 Landscape Concept

Recommended design options are illustrated in concept landscape design provided as **Appendix B**.

The concept landscape design components generally include the following:

- Primary entry point and parking area adjacent Harold Rossiter Park access.
- Secondary entry points of Baron Hay Court to the south and adjacent to the Harold Rossiter Park club rooms to the north.
- A network of primary and secondary paths integrating the site to the rest of Jirdarup Bushland Precinct.
- Restoration areas where native vegetation of similar composition to Kensington Bushland is proposed to be planted according to four habitat types, as outlined below.
- Feature locations that provide shade and may comprise seating, shelters, viewing platforms simple 'nature play' installations or fauna habitat features such as bird waterers or insect hotels.
- Infrastructure options comprising a boardwalk, amphitheatre, mounded landform, stairs and ramps.

Entry points were identified to provide optimal access and egress points for users of the Jirdarup Bushland Precinct. Dedicated car parking was considered appropriate to support users of the bushland path network. The secondary entry point adjacent to the Harold Rossiter Park is intended to connect users to the amphitheatre and provide a link to club room facilities that may support the use of the site for educational or community events.

The path network and feature locations and feature infrastructure aim to provide opportunities for passive recreation.

Proper planning and construction of the path layout shall ensure that fragmentation of remnant bushland and habitat is avoided or at least kept to a minimum. The location of paths shown are preliminary and intended to indicate where connections or thoroughfares may be considered. The paths have been generally co-located with the batter around the edge of the site to manage change in levels and next to existing trees where possible to maximize shade. The path network has a 'figure of eight' design to provide ability for users to walk a circuit within the site and linking back to other parts of the Kensington Bushland. Two options for secondary path locations to connect the site to the Jirdarup Bushland Precinct along its northern boundary are provided ('A' and 'B' in **Appendix A**). Option 'A' would require impact to relatively intact remnant vegetation within the Kensington Bushland. However, is considered to potentially be a better pathway for pedestrian movement than option 'B', which would impact less remnant vegetation between the Harold Rossiter Club Rooms and the north east boundary of the site.

Paths are expected to be constructed from crushed or stabilized compacted limestone or similar treatment. The path network will also provide an initial separation of restoration areas.

Some form of perimeter fencing may be required to reduce access to sensitive areas and further encourage the use of paths and dedicated entry points. In parts of the site the existing perimeter fencing may be considered appropriate to retain. Identified habitat of endangered or protected native fauna such as rainbow bee-eater nesting sites or black cockatoo foraging sites may be

Design Opportunities and Considerations Report

Kent Street Sand Pit



considered for installation of specific protective fencing. Fencing types and location will require further consideration during planning process.

Restoration areas are proposed over the majority of the site. Restoration would generally require progressive weed control, mulch application and planting with native species of similar composition to adjacent Kensington Bushland. A combination of the following four habitat types is suggested to provide a variety of experiences:

- 'woodland'
- 'shrubland'
- 'forest'
- 'open'.

Note the habitat labels are indicative and may be further developed or changed as planning for the site continues. The intention of the four habitat types is to ensure that a variety of different zones are established that combine to enhance native biodiversity, as well as, provide fauna habitat, shade and urban forest benefits, view lines, a sense of space and offer additional (off path) areas for passive recreation experiences.

Woodland and shrubland habitats would be planted with local tree species such as *Banksia menziesii* (firewood banksia), *B. attenuata* (slender banksia), *Eucalypt marginata* (jarrah), *E. tottiana* (prickly bark) and *Allocasuarina fraseriana* (sheoak) as well as shrubs and understory plant species common to Kensington Bushland. The woodland and shrubland restoration areas may be further themed to enhance character and recognition of selected native species.

The basin area may be planted with appropriate native wetland species. However, as the basin is not suspected to hold water for long periods a forest of *Corymbia calophylla* (marri) could be a suitable treatment and would have additional benefit of providing a foraging resource for black cockatoos.

Open areas are intended to be clear and robust such that they can allow pedestrian movement. They may include trees but with a low managed understory. No specific understory treatment is recommended, but options may include low planted shrubs with mulch paths, open mulch with native herbs or grasses or managed turf or managed grassland. Irrespective of the treatment chosen, it is envisaged that the open areas would be non-irrigated and maintained, as appropriate, to create usable spaces..

Feature locations and infrastructure were selected to take advantage of existing shade, offer viewing interest, space out visitor experiences and encourage interaction across the site. The amphitheatre provides a relatively low-cost option to give a unique character and experience to the site and build on educational and community event opportunities by providing suitable space for hosting groups. The amphitheatre concept may meet broad objectives for the environmental resource centre proposed in the *Urban Forest Strategy* (refer **Section 2.1.5**). Additionally, it was raised during stakeholder consultation that the existing club house buildings at Harold Rossiter reserve may provide an environment resource centre function in combination with features proposed in the site.

Design Opportunities and Considerations Report

Kent Street Sand Pit



5 Recommendations

5.1 Site preparation

5.1.1 Paths

Paths are expected be constructed from compacted or stabilized limestone or similar lower cost treatment. Generally, construction of paths should be preceded by application of fill overlay to ensure sufficient depth is maintained above contaminated fill and adhere to the requirements of the of the *Site Management Plan* (SERS 2017).

5.1.2 Perimeter Fencing

Perimeter fencing is expected to be Town of Victoria Park specification for conservation fencing. Fence installation will need to adhere to the requirements of the of the *Site Management Plan* (SERS 2017).

5.1.3 Construction/ installation

Construction will have to adhere to requirements of the *Site Management Plan*, which does not preclude intrusive works (excavation), rather recommending avoidance and the application of safe work methods and protective measures. As a minimum the *Site Management Plan requires* unauthorised personnel must be restricted from entering the boundaries of any intrusive work area. Nevertheless, it is expected that excavation to any depth would generally be avoided across the site. Where depth is required for footings of features additional fill overlay may first be applied. Generally, mounding or reshaping of batters to allow construction of features should be preceded by application of fill overlay to ensure sufficient depth is maintained above contaminated fill.

5.1.4 Weed control

The Jirdarup Buhland Precinct has been well maintained with effective 'integrated weed management' working in cooperation with volunteers in the local community, the Town's contactors and the Town's Natural Areas Team which has contained and limited the weed population within the site. A staged removal of weeds within the site is therefore considered a very achievable task.

Broadly, two categories of weeds occur in site that might require control to facilitate restoration:

- 'woody'
- 'grasses and herbs'.

'Woody' weeds include some exotic trees not proposed for retention occur within the site. These could be removed as soon as practicable ahead of future works. Removal may include manual or combination of manual and herbicide treatment options. Manual removal should avoid disturbance to soils subject to the *Site Management Plan*.

Much of the site is currently covered with grass and herb weeds in particular the perennial grass species *Cynodon dactylon* (couch). These weeds will need to systematically be removed and managed to facilitate revegetation.

Design Opportunities and Considerations Report

Kent Street Sand Pit

Couch typically requires significant effort to control and its removal may further allow other weeds species present as seed to express, including other non-grass weed species. Mechanical removal of the couch would require shallow excavation and so is not possible under the *Site Management Plan*. Treatment of couch and other weeds with herbicide in multiple years leading up to planting is likely to be the practical option for control.

Herbicide should only be applied by a licensed pest management technician according to Australian Pesticides and Veterinary Medicines Authority (APVMA) *Permit to allow minor use of an agvet chemical product for control of environmental weeds in various situations* (PER13333) and instructions on product label.



Plate 8: Example 'woody' weeds including *Melia azedarach* (white cedar)

Design Opportunities and Considerations Report

Kent Street Sand Pit



Plate 9: Example 'grass and herb' weeds including perennial grasses *Cynodon dactylon* (couch) and *Cenchrus clandestinus* (kikuyu)

5.1.5 Native plant establishment

Native plants are likely to be best established in restoration areas through planting of lower cost tube stock. However other methods such as transplantation, topsoil application or direct seeding may be considered ((Stevens *et al.* 2016)).

Tubestock installation requires labor for which coordinated volunteer, contract or the Towns in-house capability may be considered. Tubestock should be able to be safely installed in the top 300 mm of soil profile in line with *Site Management Plan* (SERS 2017). However, the application of a fill overlay to ensure sufficient depth is maintained above the zone of contamination would be appropriate.

Watering of plants is understood to be common practice in revegetation in other parts of Jirdarup Precinct. As water is not currently available on site a source of water may need to be established or supplementary watering option such as water truck may be considered, if watering of plants is proposed within restoration areas within the site.

5.2 Environmental considerations

5.2.1 Climate

In lieu of the provision of supplementary water, the optimal time to establish native plants in the site is between May and June of a given year during the wetter and cooler seasonal period in the south west Western Australia.

Design Opportunities and Considerations Report

Kent Street Sand Pit



5.2.2 Soils

It is unknown how native plants will perform in modified soil profile that has been filled above zone of contamination within the site. The characteristics of the modified soil are not particularly concerning and it is expected that native plants will generally perform adequately. Nevertheless, some trial and error may be expected before it is known which species perform best in the conditions that occur within the site.

Areas with native, low nutrient (sub) soils remaining following past use as sand extraction and along the batter surrounding the site may require further consideration of plant nutrition requirements during installation.

5.2.3 Fauna habitat retention and creation

Rainbow bee-eater has been observed nesting in the west of the site. These migratory birds nest in burrows in sandy banks and often utilise disturbed areas such as quarries. The nesting locations could be protected by ensuring paths are kept at a distance and/or fenced off in order to keep walkers and dogs away from such important sites. Planning of restoration activities in these locations will need to take nesting sites and the retention of sandy banks into consideration. Noting that planting of batters may reduce the habitat value to rainbow bee-eaters.

Threatened species of black cockatoo utilise the Jirdarup Bushland Precinct and creation of foraging habitat for these birds is identified as a particularly relevant opportunity. All of the native overstorey species recommended for woodland and forest habitat types will provide foraging options for black cockatoos.

While open area habitat types may include fewer native species, it is expected that they will also provide important habitat preferred by fauna that inhabit clearings such as species of bird or reptiles.

5.3 Community engagement

In preparing this report consultation was completed with the Town and key stakeholder the Friends of Jirdarup Bushland. Notice was extended to local Aboriginal / traditional owner groups via the Towns existing communication process. Further consultation with local Aboriginal groups and the wider community is expected to occur in subsequent stages of planning and development for the site. Additionally, consultation with Department of Communities on how the site might best interface with the proposed redevelopment of Agriculture Department facility south of the site.

5.4 Funding

Funding will be required from Towns budget or external sources to develop the site. Range of State base funding programs may be investigated such as Lotterywest.

Opinion of probable costs (OPCs) for proposed features and works are provided as **Appendix C**. Note that these costs are not approved estimates and should be considered indicative pending further refinement during future landscape planning or detailed design.

Design Opportunities and Considerations Report

Kent Street Sand Pit



5.5 Staging and delivery

The staging and delivery of works within the site will be well informed by the recently instigated George Street Reserve Revegetation Project on the north eastern side of the Jirdarup Bushland Precinct. Further detailed design work is required in order to set a specific program of works. However, a recommended general staging of works is as follows:

1. Landscape plan preparation including community consultation (external consultants / Town).
2. Detailed design preparation (external consultants).
3. Tender works for construction of the parking area and paths and features (Town).
4. Construct parking area, paths and features (external contractor).
5. Tender or coordinate progressive works for planting of restoration areas (external contractor / Town).
6. Complete progressive works within restoration areas (External contractor / Town).
7. Ongoing maintenance of infrastructure and restoration areas (Town).

Design Opportunities and Considerations Report

Kent Street Sand Pit



6 References

6.1 General references

- Arcioni, E. 2004, *What's in a Name? The Changing Definition of Weeds in Australia*, Environmental and Planning Law Journal, : 50-465.
- Beard, J. S. 1990, *Plant Life of Western Australia*, Kangaroo Press Pty Ltd., Kenthurst, N.S.W.
- Beard, J. S., Beeston, G. R., Harvey, J. M., Hopkins, A. J. M. and Shepherd, D. P. 2013, *The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second edition.*, Conservation Science Western Australia, 9: 1-152.
- L. a. H. Department of Planning (DPLH) 2018, *Bentley–Curtin Specialised Activity Centre Specialised Activity Centre Plan*, Western Australian Planning Commission, Perth WA 6000.
- Department of Water and Environmental Regulation (DWER) 2018, *Hydrography Linear (Heirarchy) (DWER-031)*, Perth.
- Environment Australia 2000, *Revision of the Interim Biogeographic Regionalisation for Australia (IBRA) and Development of Version 5.1 - Summary Report*, Department of Environment and Heritage.
- Government of WA 2000, *Bush Forever - Volume 1: Policies, principles and processes*, Perth.
- Gozzard, J. 2011, *Sea to scarp - geology, landscape, and land use planning in the southern Swan Coastal Plain*, Geological Survey of Western Australia.
- Hill, A. L., Semeniuk, C. A., Semeniuk, V. and Del Marco, A. 1996, *Wetlands of the Swan Coastal Plain: Volume 2A - Wetland Mapping, Classification and Evaluation*, Water and Rivers Commission and the Department of Environmental Protection, Perth.
- Purdie, B., Tille, P. and Schoknecht, N. 2004, *Soil-landscape mapping in south-Western Australia: an overview of methodology and outputs. Resource Management Technical Report 280*, State of Western Australia.
- Stevens, J., Rokich, D., Newton, V., Barrett, R. and Dixon, K. 2016, *Banksia woodlands: A restoration guide for the Swan Coastal Plain*, UWA Publishing, Crawley, Western Australia.
- T. o. V. Park (UDLA) 2019, *Public Open Space Strategy*, UDLA pty ltd.
- Wetlands Advisory Committee 1977, *The status of reserves in System Six*, Environmental Protection Authority, Perth.

Design Opportunities and Considerations Report

Kent Street Sand Pit



This page has been left blank intentionally.

Figures



Figure 1: Site Map

Figure 2: Bush Forever Site 48



Figure 1: Site Map

Project: Opportunities and Constraints Report
Document Preparation

Client: Town of Victoria

Plan Number:
EP20-055(03)--F03

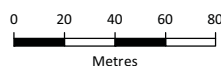
Drawn: AFF

Date: 7/07/2020

Checked: TAA

Approved: TAA

Date: 29/07/2020



Scale: 1:3,000@A4
GDA 1994 MGA Zone 50





Figure 2: Bush Forever Site 48

Plan Number:
EP20-055(03)--F04a
Drawn: AFF
Date: 19/10/2020
Checked: TAA
Approved: TAA
Date: 19/10/2020



0 50 100
Metres
Scale: 1:5,000@A4
GDA 1994 MGA Zone 50

Project: Opportunities and Constraints Report
Document Preparation
Client: Town of Victoria

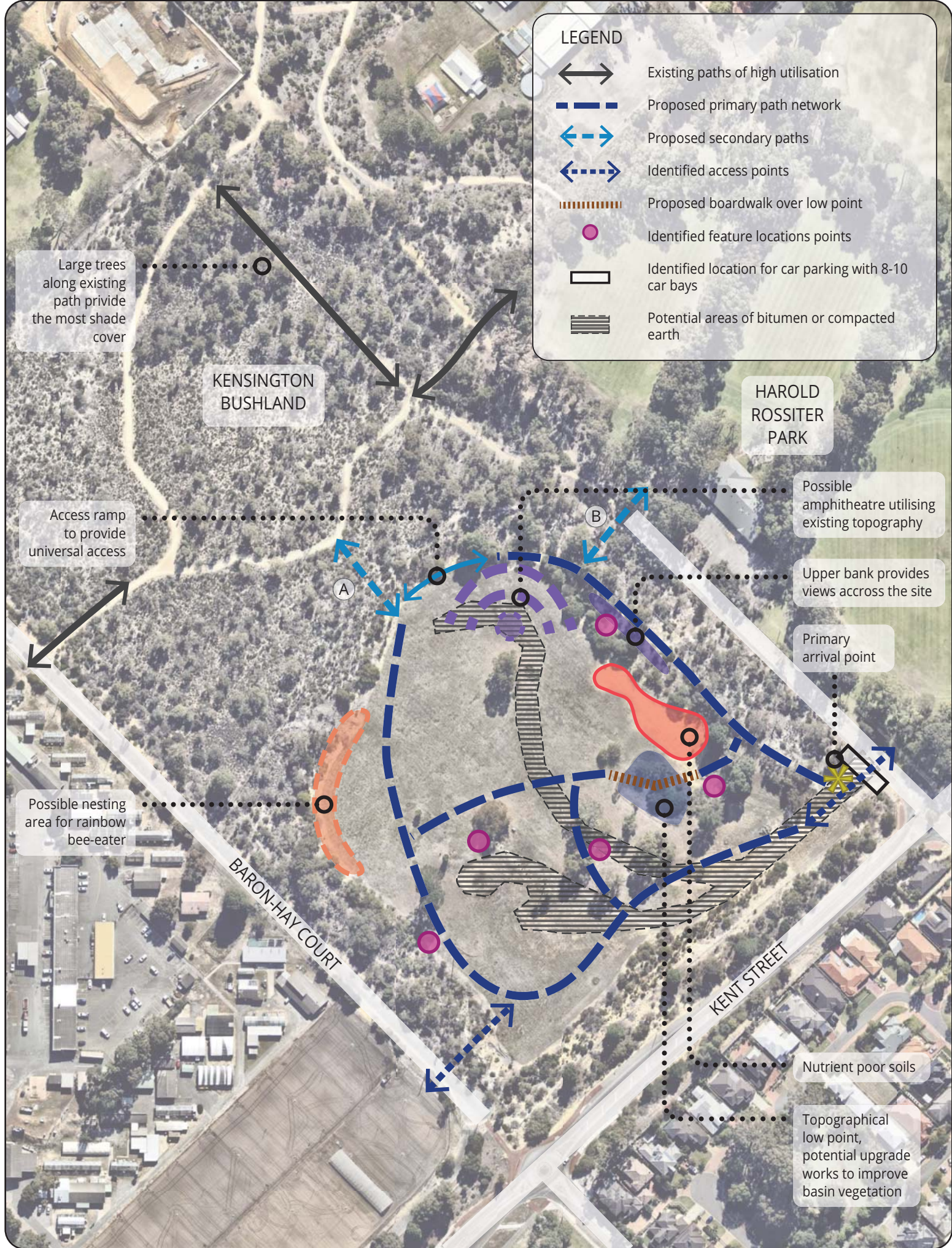


While Emmerge Associates makes every attempt to ensure the accuracy and completeness of data, Emmerge accepts no responsibility for externally sourced data used

Appendix A

Kent St Sand Pit Opportunities and Considerations





LEGEND

- Existing paths of high utilisation
- Proposed primary path network
- Proposed secondary paths
- Identified access points
- Proposed boardwalk over low point
- Identified feature locations points
- Identified location for car parking with 8-10 car bays
- Potential areas of bitumen or compacted earth

Large trees along existing path provide the most shade cover

KENSINGTON BUSHLAND

HAROLD ROSSITER PARK

Access ramp to provide universal access

Possible amphitheatre utilising existing topography

Upper bank provides views across the site

Primary arrival point

Possible nesting area for rainbow bee-eater

BARON-HAY COURT

KENT STREET

Nutrient poor soils

Topographical low point, potential upgrade works to improve basin vegetation

Appendix B

Kent St Sand Pit Landscape Design



Appendix C

Kent St Sand Pit Opinion of Probable Costs



Project: **Kent Street Sand Pit**
 Client: Town of Victoria Park
 Task: **PRELIMINARY OPINION OF PROBABLE COST**
 Plan Ref: Landscape Design
 Prepared by: ML
 Date: 19-Oct-20
 Revision: **(B) Issued for Client Review**



Total area 41,892 sq.m

No	ITEM	PROPOSED CONTENTS	QTY	UNIT	\$ RATE	COST
A PRELIMS AND SITE WORKS						
A1	Preliminaries	Site work / Mobilisation/Insurances	1	item	\$3,000	\$3,000
A2	Survey	Survey and setout, including levels	1	item	\$1,500	\$1,500
A3	Risk Assessment, CDC Certification, BL	Site Risk Assessment, Building Permits, CDC Certification (Construction certified by Building Surveyor)	1	item	\$650	\$650.00
A4	Minor earthworks /Fine grading	Final trim & grading, including additional site soil where required to meet grades (+/-100mm)	430	sq.m	\$1.00	\$430.00
A4	Imported Fill	Imported and spread clean fill to feature mounding	3,200	cube.m	\$30.00	\$96,000.00
A5	Structural Certification	Allow for structural certification for all items	1	each	\$1,200.00	\$1,200.00
A6	Existing Grass Removal	Remove and dispose of existing turf	37,970	sq.m	\$2.50	\$94,925.00
A7	Temporary Site Fencing	Allow for supply and install of temporary site fencing	1,380	lin.m	\$5.00	\$6,900.00
A8	Removal of existing bitumen	Remove and dispose existing bitumen	300	sqm	\$20.00	\$6,000.00
PRELIMINARIES & SITE WORKS SUBTOTAL						\$210,605
B HARD SURFACES						
B1	Crushed Limestone Path	Supply and install crushed limestone path to secondary path network	3,660	sq.m	\$20	\$73,200
B2	Bitumen Road	Supply and install bitumen road to car park and primary access	250	Item	\$60	\$15,000
B3	Boardwalk	Supply and install fibre reinforced plastic (FRP) boardwalk	40	lin.m	\$800	\$32,000
B4	Limestone Block Steps	Supply and install reconstituted limestone blocks to access path stairs	40	lin.m	\$250	\$10,000
B5	Limestone Block Amphitheatre	Supply and install reconstituted limestone blocks to amphitheatre	160	lin.m	\$250	\$40,000
HARD PAVEMENTS AND SOFTFALL SUBTOTAL						\$170,200
C FEATURE LOCATIONS ITEMS						
C1	Shade Structure	Supply and install custom cantilever Landmark shelter - 'King' shelter range K651 4m x 4m or approved equivalent	1	item	\$15,150	\$15,150
C2	Picnic Table	Supply and install Cox Urban Furniture parkline range table setting - wheelchair accessible or approved equivalent	1	item	\$3,400	\$3,400
C3	Bench Seat	Supply and install Cox Urban Furniture parkline range bench seat or approved equivalent	1	item	\$1,200	\$1,200
C4	Timber Wobble Logs	Supply and install natural timber wobble logs 300mm diameter cut down the centre to make for a flat surface. Stumps to be smoothed and oiled.	1	each	\$1,200	\$1,200
C5	Timber Submerged Stump/stepper	Supply and install Timber Submerged Stumps various sizes 150-500mm diameter and not exceeding 500mm height. Stumps to be smoothed and oiled.	1	each	\$150	\$150
C6	Natural log	Supply and install timber natural log various sizes 150-500mm diameter and not exceeding 500mm height. Stumps to be smoothed and oiled.	5	each	\$550	\$2,750
C7	Bird Waterers	Supply and install bird waterer	1	item	\$1,100	\$1,100
C8	Insect Hotels	Supply and install insect hotel	1	item	\$50	\$50
PLAY ELEMENTS SUBTOTAL						\$25,000
E SOFTWORKS						
E1	General Planting	Supply and install tubestock shrubs @ 3 plants per sq. m	98,670	each	\$2.50	\$246,675
E2	Soil conditioner to general planting	Supply and install soil conditioner to general planting	32,890	sq.m	\$3.00	\$98,670
E3	Mulch to planted areas	Supply and install 75mm thick mulch to planted areas	32,890	sq.m	\$5.00	\$164,450
SOFTWORKS SUBTOTAL						\$509,795
Sub-Total Landscape Works (excl. GST)						\$915,600