GARDEN STREET, SOUTHERN RIVER

ENVIRONMENTAL MANAGEMENT PLAN

Prepared for:	City of Gosnells
Report Date:	12 December 2017
Version:	6
Report No.	2017-320

pgv ENVIRONMENTAL

Contents

Contents i
List of Attachments iii
1 INTRODUCTION 1
1.1 Background 1
1.2 Scope of Works 1
2 Existing Environment 2
2.1 Topography 2
2.2 Geology and Soils 2
2.3 Hydrology 2
2.3.1 Groundwater 2
2.3.2 Surface Water 2
2.3.3 Wetlands 3
2.4 Vegetation 3
2.4.1 Vegetation Description 3
2.4.2 Vegetation Condition 3
2.5 Phytophthora Dieback 3
3 ENVIRONMENTAL MANAGEMENT PLAN 4
3.1 Site access 4
3.2 Protection of existing vegetation 4
3.2.1 Flagging 4
3.2.2 Monitoring and Contingencies 4
3.3 Clearing of Native Vegetation 4
3.3.1 Seed Collection 4
3.3.2 Mulching 4
3.3.3 Clearing Procedures 4
3.4 Fencing 5
3.5 Soil Management 5
3.6 Wetland Protection 5
3.7 Weed Management 5
3.7.1 Weed Species 5
3.7.2 Baseline Weed Mapping 6
3.7.3 During Construction 6

3.7.4 Post Construction 7
3.8 Fauna 7
3.8.1 Relocation Program 7
3.8.2 Black Cockatoos 8
3.8.3 Clearing Procedure 8
3.8.4 Speed Limits 8
3.8.5 Fauna Underpasses 9
3.9 Dieback 10
3.9.1 CEMP 10
3.9.2 Timing of Works 10
3.9.3 Pre-construction 10
3.9.4 Surface Water Management 10
3.9.5 Clean Vehicles and Plant 10
3.10 Dust Minimisation 11
3.11 Waste Management 11
3.12 Contamination 11
3.13 Dewatering 12
3.14 Erosion and Sedimentation 12
3.15 Fire Management 12
3.16 Hours of Operation 12
3.17 Induction 12
4 FUNDING, REPORTING AND REVIEW 13
4.1 Funding 13
4.2 Reporting 13
4.3 Review 13
5 REFERENCES 14

List of Attachments

Tables

Table 1: Soil descriptions

Plates

Plate 1: Holmes Street Underpass

Figures

Figure 1: Site Boundary and Footprint

Appendices

Appendix 1: Dieback Mapping (Glevan, 2016)

Appendix 2: Fauna Underpass Design

1 INTRODUCTION

1.1 Background

The City of Gosnells proposes to extend Garden Street 0.8km from Harpenden Street to the intersection of Balfour and Holmes Streets (the site). Construction of the road is proposed to start in 2018–2019. The proposed Garden Street extension between Harpenden Street and Southern River Road will enable Garden Street to become a key arterial road serving both regional and local traffic in the Southern River area.

The road reservation for Garden Street was planned in 1980 and was endorsed by a Metropolitan Regional Scheme (MRS) Amendment in 2000 administered by the Western Australian Planning Commission. The section of the road corridor between Harpenden Street and Balfour Street is located within the Holmes Street Bushland, Bush Forever site 125. It is proposed that Garden Street will eventually be extended up to the Tonkin Highway aligned with the programmed transport planning for the Southern River development area. Currently a preliminary design has been completed.

The Environmental Management Plan will be submitted as part of a Clearing Permit Application. The project is also being assessed by the Department of the Environment and Energy (DotEE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (EPBC 2016/7735).

1.2 Scope of Works

The Environmental Management Plan aims to manage environmental factors during construction and addresses the following items:

- Management of erosion and sedimentation;
- Waste Management (including human generated site rubbish);
- Excavation and stockpiling of soil;
- Management of contamination;
- Dust suppression
- Site access;
- Public access and safety;
- Protection of native vegetation;
- Protection of the wetland;
- Hygiene protocols;
- Fauna management;
- Management of dewatering (if any);
- Fire Management;
- Hours of operation including timeframes and responsibility for tasks identified; and
- Management of complaints and incidents.

All proposed employees and contractors shall be made aware, through a site induction process, of this document and its implications for their duties.

2 EXISTING ENVIRONMENT

2.1 Topography

The proposed Garden Street Extension ranges from 21 to 26m Australian Height Datum (AHD).

2.2 Geology and Soils

The site is mapped as part of the Bassendean System, the oldest of the three dune systems on the Swan Coastal Plain (Bolland, 1998) and the Pinjarra Plain System. The major soils are naturally poorly drained and many swamps occur and are outlined in Table 1.

Table 1: Soil descriptions

Soil Type	Description	Drainage
Bassendean S8 Phase (212Bs_S8)	Sand that is very light grey at the surface, yellow at depth, fine to medium-grained, sub-rounded quartz, moderately well sorted of eolian origin.	100% of the map unit consisting of this soil type has a nil to moderate risk of waterlogging.
Pinjarra Sp1 Phase (213Pj_Sp1)	Peaty Sand - grey to black, fine to medium-grained, moderately sorted quartz sand, slightly peaty, of lacustrine origin	100% of the map unit has a High to Very High risk of waterlogging
Pinjarra S10 Phase (213Pj_S10)	Sand as a relatively thin veneer over sandy clay to clayey sand of aeolian origin.	0% of the map unit has a Very High risk of water logging, 40% is High and 60% is nil to moderate or not rated.

2.3 Hydrology

2.3.1 Groundwater

The groundwater has been grouped into three distinct aquifers:

- Superficial Swan Aquifer (unconfined);
- Leederville Aquifer (confined); and
- Yarragadee north (confined) (DoW, 2017a)

The Superficial Aquifer is part of the Jandakot Mound and the Kardinya Shale Member of the Osborne Formation separates this from the Leederville Aquifer (DoW, 2017a).

The Garden Road extension site has groundwater approximately 2.8 to 8.5m below ground level at 18mAHD (DoW, 2017b).

2.3.2 Surface Water

The proposed road extension site has low-lying areas to which surface water drains. There are no watercourses passing through the site. An area of winter inundation exists in the centre of the site, coinciding with a 'sumpland' wetland.

2.3.3 Wetlands

The proposed Garden Street Garden Street extension will impact on a Conservation Category Sumpland (Unique Feature Identifier (UFI) 15423). A sumpland is defined as seasonally inundated (Hill *et al.,* 1996). Part of the road extension and some surrounding areas are inundated up to 300mm in spring.

2.4 Vegetation

2.4.1 Vegetation Description

The vegetation in the Garden Street Road Reserve consists of:

- *Banksia*, *Allocasuarina fraseriana* Woodland;
- *Banksia attenuata*, *Kunzea glabrescens*, *Melaleuca preissii* (corrected to *M. preissiana*) Low open woodland;
- *Melaleuca preissiana* woodland over *Astartea scoparia* (corrected to *A. affinis*);
- *Melaleuca preissiana* Low Open Woodland and Regelia Shrubland;
- *Melaleuca viminea* (previously incorrectly identified as *M. systena*) closed tall scrub;
- *Phlebocarya ciliata* and *Dasypogon bromeliifolius* closed Sedgeland; and
- *Banksia attenuata* and *Eucalyptus todtiana* Low Open Woodland (NAC, 2016a).

2.4.2 Vegetation Condition

The vegetation condition of the road reserve is predominantly in Good to Excellent condition, according to the condition scale of Keighery (1994) published in Bush Forever (Government of Western Australia, 2000) (NAC, 2016).

2.5 Phytophthora Dieback

A Dieback Survey undertaken as part of the environmental studies of the site was undertaken by Glevan (2016). The survey concluded that:

- That the majority of the Garden Street Road Reserve was observed to be infested
- Infested areas were generally associated with low lying wetland areas
- One portion of Banksia Woodland on higher ground to the southern end of the site had no observable signs of Phytophthora Dieback present
- One sample taken towards the north of the site tested positive for Phytophthora Dieback.

Dieback mapping is included in Appendix 1. The northern part of the road reserve that was not included in the study is dominated by Banksias and therefore is considered highly unlikely to be infested.

3 ENVIRONMENTAL MANAGEMENT PLAN

3.1 Site access

Access to the site will not be possible for the public during road construction. Contractor access points will only be in completely degraded areas on existing tracks and from the existing road.

3.2 Protection of existing vegetation

3.2.1 Flagging

Prior to the commencement of construction, the proposed construction footprint will be accurately surveyed, pegged and flagged. Prior to any clearing activities the site supervisor and clearing manager will induct all clearing contractors on the site showing the extent of clearing and providing information regarding the importance of protecting the vegetation outside of the footprint.

3.2.2 Monitoring and Contingencies

The boundary of the footprint will be inspected weekly to ensure there is no damage to the vegetation outside the footprint. If vegetation is impacted outside of the footprint, the matter will be reported to the Construction Supervisor, the City and the Department, and corrective action taken to ensure no repeat instances. Any area(s) impacted will be subsequently revegetated in accordance with the Garden Street Revegetation Plan.

3.3 Clearing of Native Vegetation

3.3.1 Seed Collection

Prior to the commencement of construction, native seed will be harvested to be used in rehabilitation in accordance with the Garden Street Revegetation Plan.

3.3.2 Mulching

Mulched material can make a substantial contribution to the on-site seed bank and when re-spread in the relatively short term (i.e. within six months) and is usually very successful in aiding the re-establishment of vegetation. Cleared native vegetation in areas deemed to be dieback free will be used to generate chipped mulch material. Mulch will be used on batters and other cleared areas requiring stabilisation. Mulching of cleared native vegetation will be conducted concurrently with clearing works. The mulched material will be stockpiled close to the source of mulch in a nearby cleared area for reuse during the revegetation phase.

3.3.3 Clearing Procedures

The Construction Supervisor will require contractors and subcontractors to adhere to the following clearing procedures within the development area:

- Native vegetation to be cleared will be removed in a systematic manner and stockpiled for mulching and/or chipping for later use in rehabilitation and landscaping works.
- The stockpiling of larger logs that may be suitable for rehabilitation works will be undertaken and will be used for site stabilisation and access control where appropriate.

- Cleared areas will be temporarily stabilised with water, hydro-mulch or other stabilising material as necessary until further works are implemented.
- No burning of cleared vegetation will be permitted at any stage during clearing or construction activities.
- No vehicles involved in clearing or earthworks and no soil or mulch from clearing activities will be permitted to be moved outside the fenced construction footprint into the surrounding native vegetation. This will reduce the potential for introduction or spread of any pathogens or weeds to the balance of the Bush Forever Site on either side of the construction footprint.

3.4 Fencing

A temporary or permanent fence will be constructed at the limit of ground disturbing activities immediately after clearing, and maintained for the duration of the works. The fence will be at least 1800mm high, and will be inspected weekly to ensure its function and placement are maintained.

3.5 Soil Management

The management of topsoil during the initial phases of construction will be to:

- Retain suitable topsoil for placement on areas where revegetation and landscaping will be undertaken.
- Suitable topsoil will be:
  - Of a suitable texture (with not too much clay content)
  - From areas with a low weed burden; and
  - From areas that are free of dieback.

Stockpile locations and management will be outlined in detail in the Construction Environmental Management Plan.

3.6 Wetland Protection

The footprint of the road runs through the wetland area that becomes inundated in winter/spring. This part of the road construction will require filling. The design of the road will ensure that the surface and shallow sub-surface hydrological balance of the wetland either side of the road is maintained which is most likely to involve the use of culverts. Hydrological modelling will be undertaken during the design phase to ensure the final design effectively maintains the water balance of the bisected wetland.

3.7 Weed Management

3.7.1 Weed Species

Weed management will seek to prevent the establishment or seeding of any colonising exotic species in the construction footprint. Target species will include, but not be limited to:

- Weeds declared under the Biosecurity Agriculture Management Act, 2007 (BAM Act);
- Weeds listed in the in the top 30 priority environmental weeds in the Swan Coastal Plain NRM Region Environmental Weeds census and prioritisation (Bettink and Keighery, 2008) as recommended by the Department of Parks and Wildlife (DPaW); and

- Weeds considered to be local priority species by the City of Gosnells, such as Love Grass and Paddy Melons.

3.7.2 Baseline Weed Mapping

Baseline weed mapping will be undertaken prior to the commencement of revegetation activity in alignment with DPaW's *Standard Operating Procedure Techniques for mapping weed distribution and cover in bushland and wetlands* (DEC, 2011). The road alignment will be traversed on foot and the following will be recorded:

- Date;
- Field observers; and
- Overall coverage of weeds using the Braun-Blanquet scale;

The Braun-Blanquet scale is:

- 1 = <5% coverage;
- 2 = 6–75% coverage; or
- 3 = 76–100% coverage.

3.7.3 During Construction

Weed management will aim to have no introduction of new weeds, or spread of existing weeds within the proposal footprint during construction. Weed vectors can include soil removed from weedy areas, recruitment on open batters or introduced by machinery.

To a large extent, management of weed hygiene shall work in conjunction with dieback hygiene management measures to maximise effectiveness and minimise costs. Specifically:

- The construction footprint will be mapped by a suitably qualified and experienced environmental consultant prior to the commencement of works to differentiate between areas from which vegetation mulch and topsoil will be harvested for storage and used in revegetation and landscaping works, and areas to be excluded from harvesting and reuse due to weed infestation.
- Areas rated as 3 on the Braun-Blanquet scale identified prior to the commencement of construction will be communicated to all employees and contractors by providing plans and demarcating these areas on the surface and/or verbal instruction, and factored into relevant works.
- Identified areas of topsoil contaminated with weeds will be stripped separately from weed-free topsoil areas, will be removed from site and not stockpiled for later use in revegetation..
- All machinery and equipment entering or leaving top-soiled or known areas of weed infestation shall be cleaned of weed propagules by manual brush-down or water spraying in appropriately controlled areas for dieback management.
- Invasive weeds that become established in the construction footprint will be eradicated on a needs basis through the site's weed management program.
- Weed management within the construction footprint will be directed by the Construction Supervisor on advice from the project's Environmental Advisor.
- The services of a licensed weed control company will be utilised for control of weeds within the site.

- All cleared weed infested vegetation and topsoil will be disposed of appropriately.

3.7.4 Post Construction

Bare, open batters and similar areas awaiting revegetation and landscaping provide a space within which weed recruitment will occur. Finished batters will be mulched and inspected monthly for weeds by the project's Environmental Advisor until revegetation and landscaping is completed. Thereafter the weeds will be managed in accordance with weed management provisions of the Revegetation and Landscaping Plan.

3.8 Fauna

3.8.1 Relocation Program

Terrestrial Ecosystems (2014) reported an abundance of Southern Brown Bandicoots (*Isoodon obesulus fusciventer*) throughout the northern sections of the project area, particularly near dense vegetation. A management strategy was recommended to be developed and implemented to avoid or minimise impacting on Southern Brown Bandicoots prior to and during the vegetation clearing program.

A subsequent fauna survey in early November 2015 (NAC, 2016b) identified the Southern Brown Bandicoot as the only native mammal species recorded at the site during a five-day survey. The report recommended that fauna trapping and translocation be undertaken prior to vegetation clearing if the Garden Street extension is approved, with fauna being relocated to suitable locations in the adjoining Holmes Street Bushland.

Clearing vegetation has the potential to harm Bandicoots if not done correctly. Bandicoots generally 'go to ground' when clearing commences and therefore can be in danger of injury or death during clearing. A Bandicoot relocation exercise will be conducted in accordance with the DPaW requirements and include an intensive trapping program conducted over 5 nights in the week prior to any clearing followed by relocation to adjoining bushland or a site designated by DPaW.

The relocation program will consist of the following:

- Up to 40 cage traps will be set in the area to be cleared and surrounding areas to protect individuals from the surrounding area if they move to the road footprint to be cleared for 5 nights;
- Any Bandicoots captured will be weighed and sexed;
- Any Bandicoots captured will be translocated to adjacent bushland or a site designated by DPaW; and
- The results of the translocation will be reported to DPaW as required by the licence conditions.

The program will be conducted by appropriately qualified zoologists with experience in Bandicoot trapping and relocation. Trapping and relocation is required to occur within the week prior to vegetation clearing.

During vegetation clearing activities, a suitably experienced 'spotter' will be engaged to visually survey the works for Bandicoots. The spotter will walk alongside clearing machinery. The spotter will warn of native fauna species in harm's way, so the driver can stop until the fauna moves on or capture and remove any fauna if required.

3.8.2 Black Cockatoos

Terrestrial Ecosystems (2014) identified four major fauna habitat types in the project area, one of which would be foraged regularly by Black-Cockatoos:

> *2.89ha of predominantly Banksia woodland containing Sheoak and Jarrah trees provides foraging opportunities for Carnaby's and Baudin's Black-Cockatoos and the Forest Red-tailed Black-Cockatoo. This habitat is in three sections in the northern part of the project area. It is the most southerly portion that supports most of the Allocasuarina and Jarrah trees. There was evidence of Forest Red-tailed Black-Cockatoos foraging on two Jarrah trees* (Terrestrial Ecosystems, 2014).

The revegetation of road batters and other areas degraded through the construction process will include, as far as practical and possible, tree and shrub species suitable for Black-Cockatoo foraging. The planting is guided by the Landscape Management Plan and outlines the establishment of 6,715m^2 of foraging habitat on batters. The loss of foraging habitat is also compensated in establishment of foraging habitat offsite.

Although the project site is within the mapped potential breeding habitat for Carnaby's cockatoo, no suitable trees with nesting hollows were recorded. One potential breeding tree is within the proposed footprint. There no known roosting sites associated with the project footprint, and Terrestrial Ecosystems (2014) found no evidence to indicate that Baudin's, Carnaby's or Forest Red-tailed Black-Cockatoos roost in the project area.

The City of Gosnells has committed to the installation of three artificial breeding hollows for Black Cockatoos in the adjacent Holmes Street Bushland. The cockatubes will be located in large trees and exact locations will be determined on advice from an appropriately qualified zoologist.

3.8.3 Clearing Procedure

To avoid any inadvertent impacts on native fauna during clearing operations the Construction Supervisor will require contractors and nominated subcontractors to adhere to 'fauna friendly' clearing procedures. Any tall trees to be cleared will require machine operators to bump or shake the tree to be cleared before removal to allow fauna to relocate. Clearing works will be visually surveyed by a suitably experienced fauna 'spotter' engaged for that purpose. If native fauna is encountered during clearing it will be allowed to make its own way from the works area. If this is not possible, a relevant specialist (e.g. zoologist) will be contracted to remove it.

If any injured wildlife fauna are encountered on the site, the Contractor will contact the DPaW's Wild Care 24-hour hotline on (08) 9474 9055 or a local veterinary hospital so that arrangements can be made for the welfare of the injured animal.

3.8.4 Speed Limits

Low speeds will be maintained during construction in the road reserve to minimise the impact of road fauna deaths on large animals such as bandicoots, and terrestrial fauna such as lizards, frogs and snakes. Signage will be erected to indicate appropriate travelling speeds, and should also indicate the possible presence of wildlife.

3.8.5 Fauna Underpasses

A fauna underpass beneath Holmes Street has been separately constructed 230m to the southwest of the project area, linking vegetation on either side of the roadway and providing safe fauna passage. NAC (2016B) recommended the construction of at least one other beneath Garden Street to connect bushland areas on either side. It was further recommended that:

- Given the width of the road reserve, it may be necessary to provide daylight opportunities along the length of the underpass;
- That suitably located and sized woody debris be installed to provide fauna refuge;
- Entry/exit points of the underpasses should be suitably revegetated to provide fauna cover and refuge; and
- Fauna impermeable fencing should be provided along both sides of the length of the road to prevent fauna movement across the road itself, and to guide fauna to the underpasses.

The design of the Garden Street Extension includes two fauna underpasses located at the northern part of the site that connects the bushland that goes north and a second one connecting the main parts of the southern bushland (Figure 1). The location in these areas is critical to provide connectivity with large enough areas of habitat and avoid areas that are seasonally inundated. The use of two fauna underpasses close to each other will reduce the risk of predators taking advantage of the funnelling effect of underpasses on fauna. These underpasses will provide linkage to the existing Holmes Street underpass. The underpasses provide continuous access to surrounding parts of bushland. Additionally culverts installed for surface water management will also double as fauna underpasses when not inundated, providing additional seasonal linkage.

Revegetation will be undertaken as close to fauna underpasses as possible to reduce risk of predation by foxes and cats, using thick shrub species as detailed in the Landscape Management plan:

- *Astartea affinis*;
- *Calothamnus lateralis*;
- *Melaleuca teretifolia*; and
- *Regelia ciliata.*

The underpasses will be designed to ensure they are passable all year round and to reduce risk of predation, furniture (objects to provide shelter) and higher pathways will be installed. Areas that are likely to be flooded in the wetter months will be avoided as underpass locations. The existing Holmes Street culvert, and a second one located north of Harpenden Street, were designed on the advice of PaWS fauna specialist John Dell, and have internal dimensions of 1200mm wide, 450mm high, with accompanying headwall (Plate 1).

The Garden Street underpasses are proposed to be the same design as those constructed under Holmes Street. The underpasses are 1200x450mm with a precast headwall, light well in the centre of the median strip and 50mm of sand in the base of the culvert (Appendix 2).

Plate 1: Holmes Street Underpass



Photo courtesy of City of Gosnells

Fauna-impermeable fencing will be installed at the base of the road batter along both sides of the length of the extension to prevent fauna entering the road carriageway. It will also serve to 'funnel' fauna into the underpass.

3.9 Dieback

3.9.1 CEMP

The requirement for dieback management and detailed management will be included in the Construction Environmental Management Plan that will be prepared prior to construction commencing. The following principles will be included.

3.9.2 Timing of Works

The spread of *Phytophthora* Dieback is more prevalent in the winter months when the soil is wet and overland flows can spread the disease quickly. Timing for the proposed construction will be in drier months.

3.9.3 Pre-construction

Areas Uninfested with Dieback will be clearly demarcated to ensure soil transfer does not occur from infested areas. Mulched material from dieback infested areas will not be used.

3.9.4 Surface Water Management

Surface water can potentially transfer soil and dieback spores into areas that are uninfected with dieback. To prevent transfer the soil in stockpiles and on constructed batters will be stabilised so it is not prone to water erosion and being washed into the outside of the construction footprint. The management of stormwater will ensure there is no soil transfer through erosion.

3.9.5 Clean Vehicles and Plant

All machinery and vehicles entering the site will be cleaned of soil and vegetation prior to entering and leaving the Uninfested areas. Access to the Uninfested areas will be restricted to two points as far as is practicable to ensure minimised but adequate access and egress at which a wash-down facility

will be provided, and dieback hygiene protocol followed. Details will be included the Construction Environmental Management Plan.

3.10 Dust Minimisation

The management of dust will be required to prevent seed dispersal of weeds, spread of dieback and nuisance dust to nearby residents. Dust minimisation will be outlined in detail in the Construction Environmental Management Plan and will include:

- Installation of wind fencing;
- Appropriate materials for access points such as crushed limestone that generate minimal dust;
- Minimisation of open ground and treatment by appropriate surface stabilisation;
- Water carts available if dust is being generated;
- Mulching of all batters as soon as possible after completion;
- Truck load coverage; and
- Monitoring and complaints management.

3.11 Waste Management

Ineffective management of foodstuffs, waste and rubbish can significantly increase the number of unwelcome feral animals. Feral animals such as house mice, cats and foxes predate on and often out-compete endemic species. Paper and plastic bag materials can be easily transported by wind into adjoining bushland. Clean construction procedures and waste management will be required during construction.

Bins with secure lids are to be provided at the site office and toilet facilities. The use of bins and securing their lids will be included in the induction. The Construction Superintendent will be responsible for maintaining a rubbish-free site.

Specific measures will be included in the Construction Environmental Management Plan.

3.12 Contamination

The site is bushland, and not known or suspected to be contaminated. Pollution and environmental damage during construction can arise from unplanned incidents such as the following:

- Spillages of dangerous goods, chemicals, fuel and oils.
- Unlicensed discharge of pollutants to environment (air, water, noise, soil).
- Seepage or mishandling of contaminated/hazardous waste.
- Dumping of waste to an unauthorised site.
- Traffic accidents.
- Vandalism, arson and theft.

Spill Kits will be maintained in vehicles. All environmental incidents will be dealt with promptly to minimise any potential impacts. Unexpected or accidental environmental incidents will be managed in accordance with site Incident Response and Reporting Procedures to be included in the Construction Environmental Management Plan.

3.13 Dewatering

If any dewatering is required, it will be managed by a Dewatering Management Plan to be submitted to and approved by the Department of Water and Environmental Regulation (DWER). As far as practicable phases that may require dewatering are to be undertaken in March/April where groundwater is at its lowest point, decreasing the dewatering required.

3.14 Erosion and Sedimentation

All batters will be constructed to the specified grade and will be stabilised as soon as possible after they are constructed. There will be silt traps at the base of the batter to ensure the soil is not washed in the surrounding bushland. The batters will be vegetated in accordance with the Garden Street Landscape Management Plan. Specific measures for stabilisation will be included in the Construction Environmental Management Plan.

3.15 Fire Management

The risk of fire during construction will be managed through the implementation of the Construction Environmental Management Plan. This is likely to include:

- Hot work permits;
- Obeying total fire bans (including vehicle movement bans);
- Ensuring the serviceability of all equipment and plant (including spark arrestors on exhausts);
- Location of fire extinguishers;
- Emergency response;
- Induction of personnel; and
- Prevention of unauthorised access to the construction area and ensuring the work site is kept clean.

3.16 Hours of Operation

Vehicle movement around the site during construction increases the likelihood that fauna may be injured or killed. This problem is particularly acute at dusk and at night when mammals are actively foraging. Hours of operation will be restricted to daylight hours, avoiding dusk and dawn.

The working hours on site will be Monday – Friday 07:00 to 17:00. No works to start or machinery to be operated before or after the above hours without approval from the CEO of the City of Gosnells. No works will take place on weekends without approval by the CEO of the City of Gosnells.

3.17 Induction

The Environmental Management Plan will be supplied by the Construction Superintendent to contractors on the site and the induction will address all management procedures and requirements outlined in this plan.

4 FUNDING, REPORTING AND REVIEW

4.1 Funding

Funding for the implementation of the Environmental Management Plan is the responsibility of the City of Gosnells.

4.2 Reporting

Any breaches or complaints of the management plan will be reported in accordance with the City of Gosnells and the appointed contractor procedures.

4.3 Review

It is not expected to require more than five years before the Garden Street extension is completed, however if construction is delayed the report will be reviewed in five years to ensure all information and management measures are up to date.

5 REFERENCES

Bettink, K and Keighery, G (2008) Environmental weed census and prioritisation, Swan NRM Region Swan Catchment Council (SCC) and Department of Environment and Conservation (DEC) Perth Western Australia

Bolland, M. (1998) *Soils of the Swan Coastal Plain.* Department of Agriculture. Bunbury, Western Australia.

Department of Agriculture and Food Western Australia (DAFWA) (2017) Natural Resource Management Shared Land Information Platform. Accessed March 2017 http://maps.agric.wa.gov.au/nrminfo/framesetup.asp Government of Western Australia, Perth.

Department of Water (DoW) (2017a) Hydrogeological Atlas. Accessed March 2017 http://atlases.water.wa.gov.au/idelve/hydroatlas/ Government of Western Australia, Perth.

Department of Water (DoW) (2017b) Perth Groundwater Map Accessed March 2017 https://maps.water.wa.gov.au/#/webmap/gwm Government of Western Australia, Perth

Glevan Consulting (2015) Holmes Street Bushland North – Phytophthora Dieback occurrence assessment – Version 2.0. Unpublished report prepared for the City of Gosnells, prepared by Glevan Consulting.

Hill, A.L., Semeniuk, C.A., Semeniuk, V. and Del Marco, A. (1996) Wetlands of the Swan Coastal Plain. Vol. 2A Wetland Mapping, Classification and Evaluation Main Report. Perth, Western Australia.

Natural Area Consulting (NAC) (2016a) Report – Garden Street Road Reserve Environmental Assessment Report 2015 9 16 NAC Prepared for City of Gosnells Perth, Western Australia

Natural Area Consulting (NAC) (2016b) Report – Fauna Management Plan Holmes Street Bushland North Report 2016 01 13 NAC Prepared for City of Gosnells Perth, Western Australia

Terrestrial Ecosystems (2014) Black Cockatoo Habitat Assessment Reference: 2014-0040-002-gt Prepared for City of Gosnells Perth, Western Australia

FIGURES

PINPOINT CARTOGRAPHICS (08) 9562 7136 10266-wkpln01.dgn

N

0 20 40 60 80 100m

SCALE 1 : 2 250 at A3 (MGA)

Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Proposed Road
- Proposed Kerb
- Proposed Earthworks
- Proposed Fence

HARPENDEN STREET

GARDEN STREET

HOLMES STREET

BALFOUR STREET

Fauna Culvert

Fauna Culvert

Extent of Vegetation Mapping

6 449 250mN

6 449 000mN

6 448 750mN

401 500mE

401 750mE

R 46361 4526

R 47575 5037

R 47575 8000

CADASTRAL SOURCE: Landgate, March 2017.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown February 2017.

pgv ENVIRONMENTAL

City of Gosnells
GARDEN STREET
SOUTHERN RIVER

Drawn: J. Cabot | Date: 9 Mar 2017

Job: 10266 Rpt: -- | Revision: A

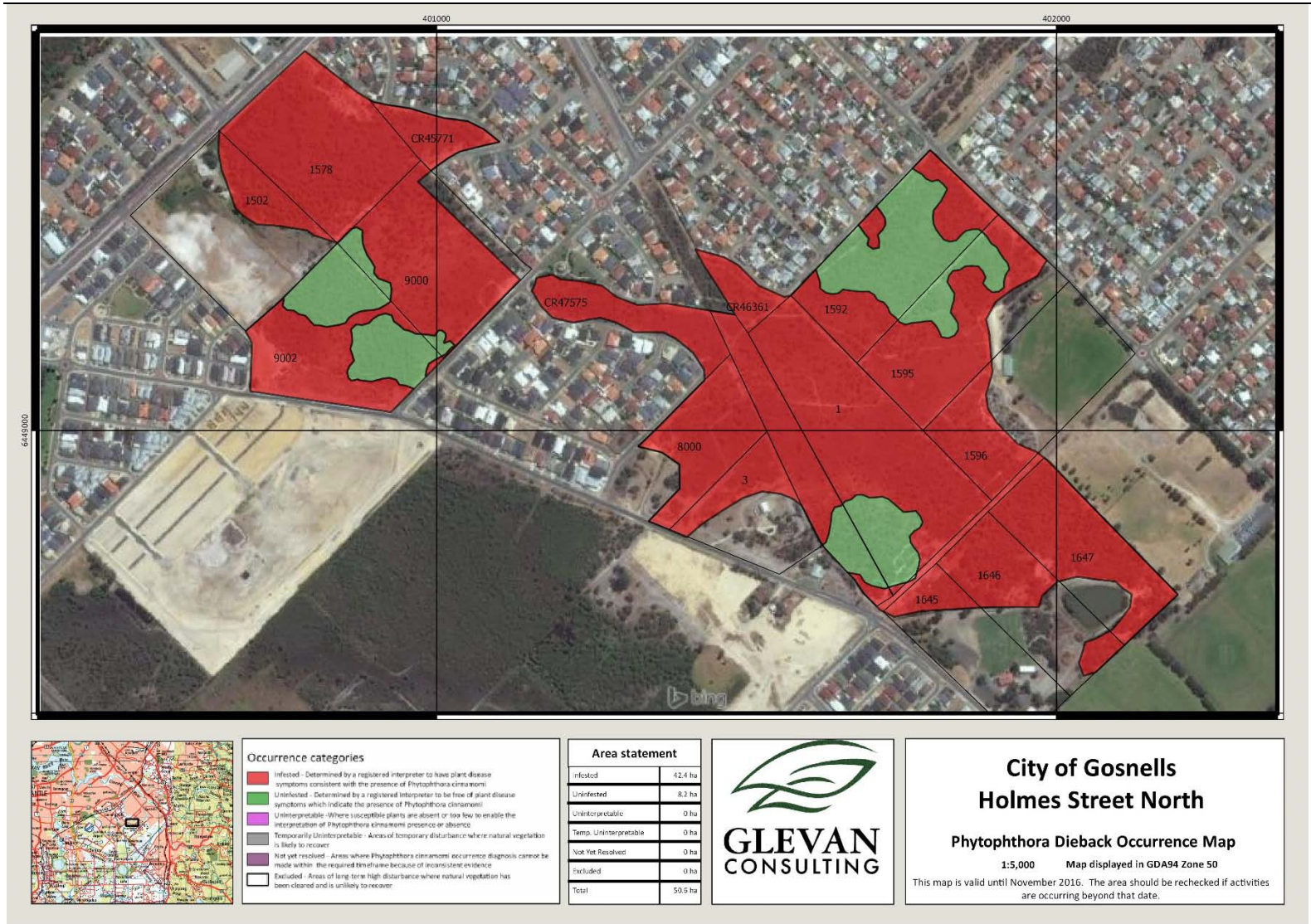
SITE BOUNDARY AND FOOTPRINT

Figure 1

APPENDIX 1

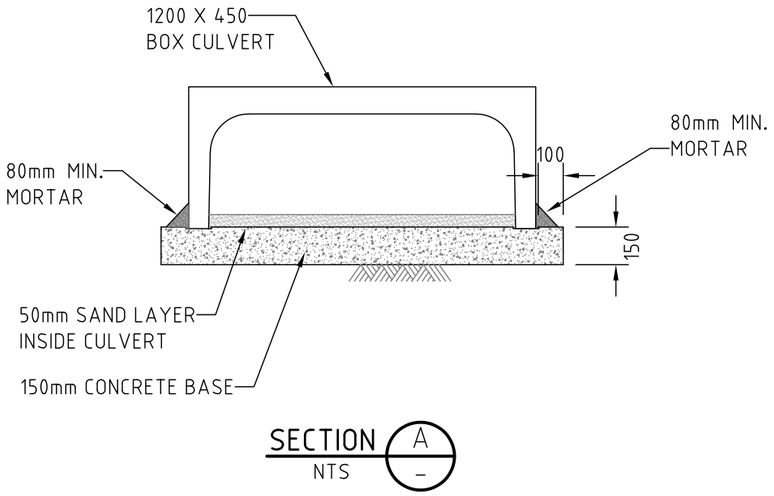
Dieback Mapping (Glevan, 2016)

10 Appendix – Phytophthora occurrence map

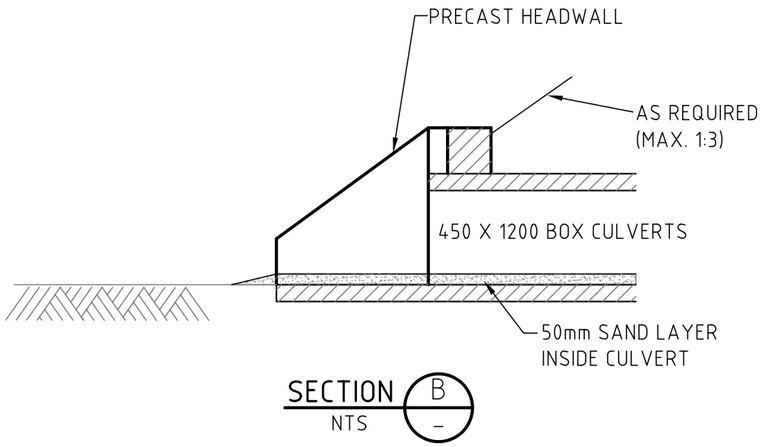


APPENDIX 2

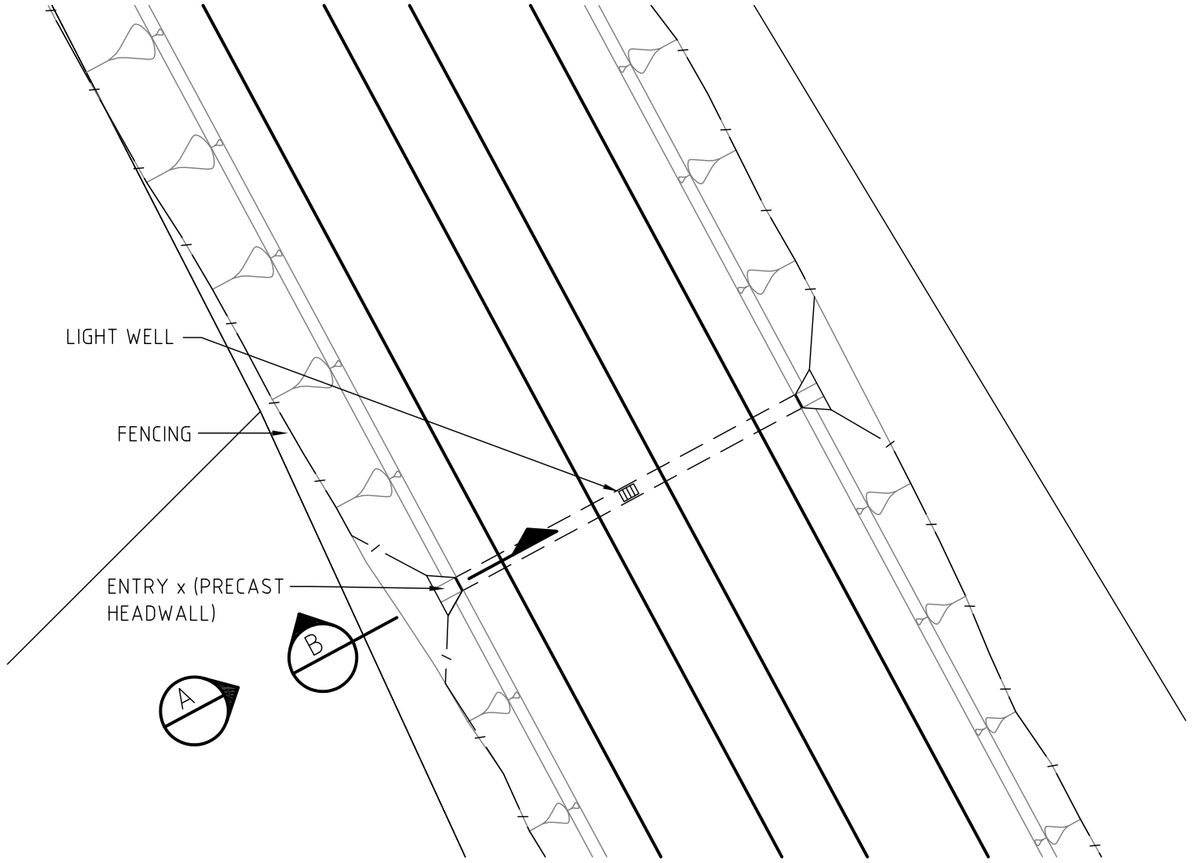
Fauna Underpass Design



SECTION A
NTS



SECTION B
NTS



LAYOUT PLAN
SCALE. 1:500

1:500

0 5m 10 15 20 25 30 35 40 45 50 55 60 65 70 75

DIAL BEFORE YOU DIG www.1100.com.au

AMENDMENTS						
REV	DATE	DESCRIPTION	BY	CHK'D	APP'D	

GENERAL NOTES

1. THIS DRAWING ALWAYS REMAINS THE PROPERTY OF THE CITY OF GOSNELLS AND MUST NOT BE RETAINED OR REPRODUCED WITHOUT PERMISSION.
2. IN THE ABSENCE OF THE APPROVED SIGNATURE (ie MANAGER TECHNICAL SERVICES) THIS DRAWING SHALL BE TREATED AS PRELIMINARY.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. ANNOTATED DIMENSIONS SHALL ALWAYS TAKE PRECEDENCE OVER SCALED DISTANCES.

NOTE:
ALL WORKS SHALL BE IMPLEMENTED IN ACCORDANCE WITH THE CITY'S SPECIFICATIONS, CONTRACTUAL CONDITIONS AND INDUSTRY BEST PRACTICE. ANY CONFLICTS, OMISSIONS, ISSUES OR VARIATIONS ARE TO BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE PROJECT DESIGNER.

CITY OF GOSNELLS
2120 Albany Highway Gosnells 6110
PO Box 662 Gosnells 6990
Western Australia
Telephone 08 9397 3000
Facsimile 08 9397 3333
Online www.gosnells.wa.gov.au

JOB NUMBER	DATUM GRID SYSTEM	SCALE VERTICAL

GARDEN STREET EXTENSION
HUNTINGDALE

FAUNA UNDERPASS
TYPICAL LAYOUT

DESIGN	DRAWN	DATE
SURVEY	CHECKED	DATE

PLAN No
E90-17-800
A3

CHIEF ENGINEER TECHNICAL SERVICES

ACTING CHIEF ENGINEER

24/11/2017 3:02:06 PM S:\CURRENT PROJECTS\GARDEN STREET HARPENDEN TO PASSMORE 2016 JOB XXXXX\DWG\E90-17-800_ FAUNA UNDERPASS DETAILS.DWG