



Stream Environment and Water

Tonkin Highway Grade Separated Interchange (Hale Road to Welshpool Road)

DRAINAGE MANAGEMENT AND MONITORING PLAN

JUNE 2026

MAIN ROADS WESTERN AUSTRALIA

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1 Executive Summary

Table 1: Summary of the proposal and context for this DMMP

Item	Description
Proposal name	Tonkin Highway Grade Separated Interchanges (Hale Road and Welshpool Road)
Proponent name	Main Roads Western Australia
Ministerial Statement number	1249
Purpose of DMMP	To fulfill the requirements of the objective based condition B3-2(1) in Ministerial Statement 1249 Condition B3-2(1) Minimise impacts to the hydrological regime and water quality of wetlands adjacent to the development envelope
Key environmental factor	The key environmental factor and associated EPA objective for this DMMP is: Inland Waters: <i>To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.</i>
Condition clauses (if applicable)	Condition B3-3 The proponent must prepare a <i>Drainage Management and Monitoring Plan</i> (Environmental Management Plan) that satisfies the requirements of condition C4 and demonstrates how the inland waters environmental objective in condition B3-2(1) will be achieved. Condition C4 C4-1 The environmental management plans required under B3-3 (and B5-3) must contain provisions which enable the achievement of the relevant objectives of those conditions and substantiation of whether the objectives are reasonably likely to be met, and must include: (1) Management actions (2) Management targets (3) Contingency measures if management targets are not met; and (4) Reporting requirements C4-2 The environmental management plan required under condition B3-3 is also required to include: (1) detailed design and figures showing the location and configuration of drainage infrastructure in relation to relevant environmental values (2) a monitoring program capable of determining the effectiveness of drainage infrastructure in achieving the environmental objective specified in condition B3-2(1)

Item	Description
	(3) demonstration that the drainage design is consistent with the principles of the WA Better Urban Water Management Framework and WA Stormwater Management Manual
Key components in the EMP (if applicable)	Section 3.4 Monitoring, propose using Objective-based EMP table as per EPA Template.
Proposed construction date	2026
EMP required preconstruction	Yes

2 Context, Scope and Rationale

2.1 Proposal

Main Roads propose to upgrade a 4.2 km section of Tonkin Highway to a six-lane dual carriageway between Roe Highway and Kelvin Road within the City of Kalamunda (Figure 1). The approved development envelope for the proposal intersects the northeast section of the Greater Brixton Street Wetlands (GBSW), several Conservation Category Wetlands (CCW), Yule Brook and Woodlupine Brook. The EPA recommended that residual impacts to these environmental values can be managed to meet the EPA objective for inland waters, subject to implementation conditions and procedures in Ministerial Statement 1249 (MS1249) (EPA 2025), issued on 18 August 2025.

This Drainage Management and Monitoring Plan (DMMP) is a requirement of MS1249 condition B3-3 to demonstrate how the proponent will meet the inland waters environmental objective in condition B3-2(1):

- minimise impacts to the hydrological regime and water quality of wetlands adjacent to the development envelope (DE).

The DMMP is an objective based environmental management plan (EMP) and has been prepared in accordance with *Instructions: How to prepare Environmental Protection Act 1986 Part IV environmental management plans* (EPA 2024a). The plan details the management actions, targets, monitoring and contingency measures that the proponent will implement to achieve the environmental objective.

Condition C4-2 of MS1249 requires the DMMP to include details of drainage infrastructure, a monitoring program and demonstrate drainage design is consistent with the principles of the WA Better Urban Water Management (WAPC 2025a and 2025b) framework and the WA Stormwater Management Manual (DWER 2022).



Figure 1: Proposal location and development envelope

Tonkin Hwy grade separated interchanges
(Hale Rd and Welshpool Rd)
Drainage Management and Monitoring Plan



0 0.5 1 km

Base map © ESRI and its data suppliers, Landgate (2020)
CRS: GDA2020/MGA zone 50
Project ref: 242142
Date: 21/05/25 Author: CS



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2.2 Key Environmental Factor

The key environmental factor relevant to this objective based DMMP is Inland Waters, described by EPA as follows:

To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected (EPA 2018).

The proposal has the potential to significantly impact inland waters (EPA 2024b) from:

- direct loss of 30 ha of wetlands, of which 3.78 ha is within the GBSW
- potential changes to local hydrological processes including groundwater recharge and surface water runoff volumes through landform changes from compaction and fill, and increasing hard surface areas
- potential changes to hydrological regimes of Yule and Woodlupine brooks through earthworks and alteration of surface water flows which in turn may affect downstream environmental values including within the GBSW
- potential water quality impacts through erosion/sedimentation during clearing and disturbance of watercourses, accidental chemical spills, and from potentially polluted and untreated surface/road run-off during operations (e.g. metals).

Further details of the proposed activities and potential environmental impacts are summarised in Table 2.

Table 2: Proposal activities, affected environmental value and impact to key environmental factor

Inland Water component	Proposal activity to cause impact (description)	Affected environmental value	Potential impact to environmental factor
Surface water Groundwater	- clearing of native vegetation and wetlands - installing culverts to manage surface water flow - Refuelling, chemical or hydrocarbon storage or stockpiling of material or topsoil within the DE during construction - Earthworks and changes to landform including compaction and fill required for construction and operation - increased area of impervious surfaces from permanent road infrastructure.	- hydrological processes including groundwater recharge and surface water run off volumes - water quality of groundwater and surface water - water quality, hydrological regime and processes of receiving environments i.e. GBSW, other CCW	Changes in water quality of groundwater and surface water, and indirectly to receiving environments, due to contamination from chemical or hydrocarbon leaks/spills, mobilisation of wind-borne material, uncontrolled road runoff, erosion or sedimentation due to disturbance of watercourses. Disruption to the hydrological regime of GBSW and other CCW due to earthworks, permanent infrastructure, increased road runoff.

2.3 Condition Requirements

This DMMP is submitted to meet the requirements of MS1249 and the environmental objective condition B3-2(1), detailed in Table 3.

Table 3: EPA conditions of approval related to Inland Waters

MS 1249 condition	Requirement	Section in DMMP
Part B - B3 Inland Waters		
B3-2(1)	The proponent must implement the proposal to meet the following environmental objective: (1) minimise impacts to the hydrological regime and water quality of wetlands adjacent to the development envelope;	Whole document
B3-3	<i>Drainage Management and Monitoring Plan (Environmental Management Plan)</i> The proponent must prepare a <i>Drainage Management and Monitoring Plan</i> (Environmental Management Plan) that satisfies the requirements of condition C4 and demonstrates how the inland waters environmental objective in condition B3-2(1) will be achieved and submit the plan to the CEO.	
Part C - Environmental Management Plans and Monitoring: Conditions related to management actions and targets for objective based conditions		
C4-1	The environmental management plans required under B3-3 and B5-3 must contain provisions which enable the achievement of the relevant objectives of those conditions and substantiation of whether the objectives are reasonably likely to be met, and must include: (1) management actions (2) management targets (3) contingency measures if management targets are not met (4) reporting requirements	Section 3
C4-2	The environmental management plan required under condition B3-3 is also required to include: (1) detailed design and figures showing the location and configuration of drainage infrastructure in relation to relevant environmental values; (2) a monitoring program capable of determining the effectiveness of drainage infrastructure in achieving the environmental objective specified in condition B3-2(1); and (3) demonstration that the drainage design is consistent with the principles of the WA Better Urban Water Management Framework and WA Stormwater Management Manual.	Appendix B Section 3.3 Section 2.5

2.4 Rationale and Approach

Available information relevant to inland waters within and adjacent to the DE was used to provide the rationale and approach to meet the environmental objective of this DMMP. Environmental assessments that were undertaken to inform the ERD (Main Roads 2022) were used to identify the following, which are detailed further in the following sections:

- identify assumptions and uncertainties
- determine the management actions and targets
- develop the monitoring program.

2.4.1 Management objective

This DMMP describes how monitoring and management of the drainage system will demonstrate compliance with MS1249 condition B3-2(1). The proponent must implement the proposal to minimise impacts to the hydrological regime and water quality of wetlands adjacent to the DE.

2.4.2 Survey and study findings

Key findings of hydrological and environmental investigations that were undertaken to identify the water dependent values within and adjacent to the DE, and the potential impact to those values from proposal activities are described in Table 4.

A summary of environmental values relevant to this DMMP and the location of drainage infrastructure in relation to those environmental values is provided in section 2.4.5.

Table 4: Key findings relevant to the hydrological regime and water quality of wetlands adjacent to the DE

Report	Overview	Findings relevant to wetlands
Tonkin Highway Upgrades – Roe Highway to Kelvin Road. Annual monitoring report (360 Environmental 2021)	Baseline preconstruction water monitoring conducted from August 2020 to May 2021 across four monitoring rounds. Established condition of water resources, including groundwater, waterways, wetlands and drains, in the vicinity of the proposal. Data collected included GW level, GW quality, surface water quality, presence/absence of water in wetlands.	Groundwater was generally fresh with neutral to slightly acidic. Oxides of nitrogen, aluminium, copper, lead, mercury, nickel and zinc exceeded the ANZECC trigger values* (at least once) for slightly disturbed wetlands for southwest Australia. GW near Hale Road had the highest contaminant concentration overall (during 2020/2021 monitoring). Surface water was fresh with neutral to slightly alkaline. NO _x , TN and metals (aluminium, copper, zinc) exceeded ANZECC trigger values*. Groundwater monitoring indicated a westerly groundwater flow direction and generally shallow depth to groundwater. Groundwater levels fluctuated seasonally by up to 1 meter between Winter maximum and Autumn minimum.
Tonkin Highway Hale and Welshpool Road Interchange Hydrological Processes	Investigated hydrological processes and water quality of surface and groundwater within and adjacent to DE. Assessed groundwater and surface water	Impacts to environmental values from potential change in runoff and recharge (generated from an increase in hard surfaces) was considered unlikely or minimal under the

Report	Overview	Findings relevant to wetlands
Assessment (Stream 2023)	connectivity with Woodlupine Brook, Yule Brook, GBSW and CCW	proposed road upgrade and drainage design. The assessment concluded: - Changes to runoff and recharge resulting from the proposal were estimated to be <1% of annual catchment flows and <0.70% of recharge. - changes to the hydrology and water quality of Yule and Woodlupine brooks were predicted to be negligible. - the GBSW is largely hydrologically isolated due to historical modification of surface water systems - vegetation and wetlands in the GBSW and Hartfield Park are likely utilising groundwater from shallow perched water tables to partially meet water requirements. Deep rooted vegetation is potentially accessing the Superficial aquifer where the perching layer is absent - onsite capture and infiltration of runoff, proposed in the drainage design, will result in recharge similar to the existing and no change in the groundwater regime is expected.
Tonkin Highway (H017) Grade Separations – Hale Road to Welshpool Road East (SLK 52.73 to SLK 57.75) 15% Reference Design Report Rev D (Arup 2022)	Project Case, covering several design considerations including stormwater drainage design.	Concept level assessment of gutter spread widths, basin storage requirements and piped network hydraulics. Recommends additional storage and water quality treatment due to increases in impervious area. Use of DRAINS model to determine basin location and sizes to attenuate 1% AEP.
Environmental values and pressures for the Greater Brixton Street Wetlands on the Swan Coastal Plain (EPA 2022)	EPA advice under section 16(j) of the <i>Environmental Protection Act</i> 1986 (EP Act). Recognises environmental significance of GBSW and outlines the EIA expectations for proposals with potential to impact GBSW values.	The EPA will consider the advice in the EIA process and expects future activities and development to be compatible with the protection of the environmental values of the GBSW. Demonstration of best practice environmental management through site specific hydrological and hydrogeological investigations and stormwater management and drainage will be required.

2.4.3 Key assumptions and uncertainties

The key assumptions and uncertainties identified from previous studies, and which relate to the development of this objective based DMMP are:

- Land within the development envelope is highly modified. The hydrological regime and water quality of wetlands adjacent to the DE are already impacted by previous land uses and infrastructure.
- Drainage systems that are designed to manage local conditions and that are well maintained are effective in maintaining the existing local hydrological regimes and water quality.
- The proposed monitoring actions and targets are sufficient to determine whether the hydrological regime and water quality objective is being met.
- The drainage design available at the time of drafting this DMMP is concept level and indicative (Appendix A). Drainage specifications will be finalised as part of the drainage design and construct phase.
- Change in climate, other than expected seasonal variation, may influence the ability of the drainage system to manage stormwater runoff as expected.
- Groundwater monitoring data undertaken for the proposal from August 2020 to May 2021, combined with assessments of regional data, is sufficient to develop monitoring actions and targets for the DMMP.
- Baseline groundwater monitoring sites will be destroyed during construction (360 Environmental 2021). Future monitoring sites will be located as close as practicably possible to the baseline groundwater monitoring sites (Appendix C). Additional sites will be established where gaps in monitoring are identified near key environmental values (see Section 2.5.1).

2.4.4 Risk based approach

The risk assessment that was completed for the proposal and submitted in the Environmental Review Document (ERD) (Main Roads 2022) has been used to identify and prioritise management targets and actions for this DMMP.

EPA Report 1769 (EPA 2024b) determined that implementation of the mitigation and management measures proposed in the ERD were sufficient to ensure inland water environmental values would be protected (subject to implementation conditions) and the environmental outcome for surface water and groundwater is likely to be consistent with the EPA objective for this factor.

The mitigation and management measures in the ERD that relate to minimising potential impacts to the hydrological regime and water quality from the proposal are presented in Appendix B.

2.5 Rationale for Choice of Provisions

The management and monitoring approach selected for this DMMP is consistent with National and State guidelines and policy for urban stormwater management, including:

- State Planning Policy 2.9 Water (WAPC 2025a) (replaces Better Urban Water Management)
- Planning for Water. Guidelines for the implementation of State Planning Policy 2.9 Water (WAPC 2025b)
- Stormwater Management Manual for Western Australia (DWER 2022)
- Decision Process for Stormwater Management in WA (DWER 2017)
- Australian Runoff Quality: A guide to water sensitive urban design (Engineers Australia 2006)
- Australian Rainfall and Runoff Guidelines (Coombes and Roso 2019)
- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPC 2013)

The site-specific environmental values which will be impacted by the proposal, and which are relevant to this objective based DMMP are presented in section 2.5.1. Section 2.5.2 describes the drainage strategy and demonstrates implementation of best practice drainage design to minimise potential impacts to key environmental values.

2.5.1 Key environmental values

The proposal is located within the Mungala consanguineous wetland suite (DBCA 2017). Thirteen (13) mapped wetlands of palusplain and sumpland type intersect the development envelope (DBCA 2023), including seven conservation category wetlands (CCW), three resource enhancement wetlands (RE) and three multiple use wetlands (MU) (Main Roads Western Australia 2022) (Figure 2).

The proposal passes through the Greater Brixton Street Wetlands (GBSW), a corridor of disconnected sumpland and palusplain wetlands that extend southwest from Welshpool Road East. The DE overlaps 3.8 ha of the GBSW at its most eastern extent, which is an area of wetland that will be cleared for the proposal (EPA 2024b). Where the DE and wetland area intersect, the broader GBSW area extends southwest across an area of approximately 215 hectares (EPA 2022).

The GBSW is recognised as one of the most important wetland areas remaining on the Swan Coastal Plain and is listed on the Directory of Important Wetlands of Australia (site 74) (DCCEEW 2005), and Bush Forever (BF387, BF422) (DEP 2000). The area is noted to support threatened ecological communities, numerous threatened flora, a range of wetland habitats and highly diverse biota (EPA 2022).

Two isolated CCW wetlands which are not part of the GBSW are mapped within 50 meters of the DE southeast of Welshpool Road East.

Palusplain CCW 15020 occurs within the Hartfield Park Bush Forever site (BF320) and covers an area of approximately 57.5 ha between Hale Road and Welshpool Road East. The existing Tonkin Highway alignment passes north-south through CCW 15020 (and Hartfield Park), fragmenting the CCW and Bush Forever site.

A patch of TEC SCP10a that supports individuals of *Andersonia gracilis* (Threatened) occurs within 50 meters west of the DE in CCW 15020 (Figure 2). SCP10a is described as shrublands on dry clay flats supported by seasonally inundated clays. It is listed as Endangered under the *Biodiversity Conservation Act 2016* and forms a component of the 'Clay Pans of the SCP' TEC which is listed as Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (DSEWPC 2012). *A. gracilis* is a small shrub found on seasonally damp, black sandy clay flats near or on the margins of swamps (DEC 2006). It is listed as Vulnerable under the BC Act and Endangered under the EPBC Act.

Yule Brook and Woodlupine Brook are ephemeral water courses and the main surface water features that intersect the DE. Streamflow in the brooks is conveyed from east to west under Tonkin Highway via a bank of culverts, resulting in the brooks being highly modified, channelised waterways with sparse riparian vegetation and limited instream habitat where they intersect the DE (Main Roads 2022).

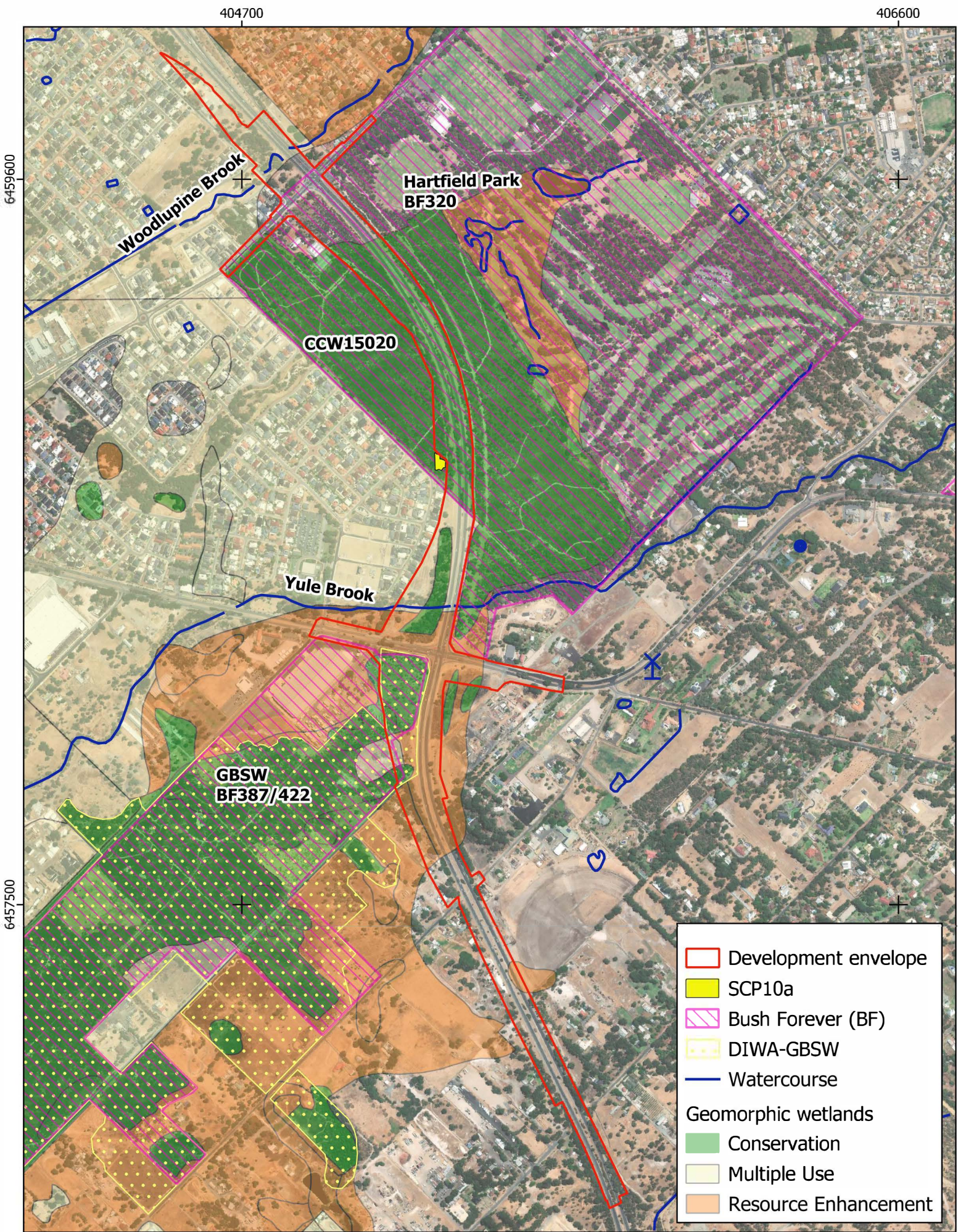


Figure 2: Key Environmental Values



2.5.2 Drainage strategy

The drainage strategy adheres to the stormwater management process provided in *Decision process for stormwater management in WA* (DWER 2017). It was developed using previous surveys and studies (Table 4) and available information of local geology/soil type, hydrogeology, depth to groundwater, hydrology, existing drainage and environmental values within and adjacent to the DE. Selected drainage infrastructure is in line with best management practices presented in the *Stormwater Management Manual for WA* (DWER 2022) and is designed to meet the runoff management objectives identified in the ERD (Main Roads 2022):

- Integrate water sensitive urban design principles
- Manage runoff to minimise impact to preconstruction hydrological regime of wetlands adjacent to the DE
- Minimise water quality impacts with sediment and erosion controls and treat contaminated road runoff on site prior to discharge to receiving environments
- Minimise clearing of vegetation and wetlands area.

The location of drainage infrastructure within the DE in relation to key environmental values is indicative (Figure 3, Figure 4, Figure 5) and based on concept design drawings provided in Appendix A (Arup 2022). Drainage specifications will be finalised as part of the design and construct phase for the proposal, where drainage features will be modified and constructed to be within the DE to avoid and minimise potential impacts to key environmental values.

Examples of the structural controls included in the drainage design are presented in Table 5. Further details of basin design and stormwater transport mechanisms within the drainage design are provided in section 2.5.2.1 Basins.

DWER (2017) establishes the criterion of intercepting road runoff generated from small frequent rainfall events, typical of the Perth Region, or the first 15mm of a rainfall event for the outcome of ecological protection. The drainage strategy uses this criterion as the basis for the minimum volume of road runoff required to be infiltrated at source and treated for mobilised pollutants at source.

The main contaminants expected in road runoff, likely to be mobilised in the first 15mm of rainfall from an arterial road such as Tonkin Highway, include sediment/total dissolved solids, heavy metals, hydrocarbons/oil/grease, inorganic constituents (minerals and metals) and gross pollutants. The pre-development monitoring program conducted from August 2020 to May 2021 (360 2021) provides baseline groundwater data for the main contaminants (Appendix D). The drainage strategy prioritises treatment and removal of these contaminants as target pollutants. Nutrients (total nitrogen and total phosphorous) may be present in road runoff at low concentrations (compared to contributions from the surrounding catchment) and was considered in the drainage strategy but at a lower priority compared to the target pollutants (DWER 2022).

The drainage strategy addresses infiltration of road runoff within the DE (at source), complying with *Decision Process for stormwater management in WA* (DWER 2017). The drainage infrastructure is designed to maintain the pre-development hydrological regime for minor rainfall events (the critical 1 exceedance per year event (1 EY)) and small frequent rainfall events (the first 15mm of a rainfall). Components of the drainage design have the capacity to manage excess runoff generated from major rainfall events (rainfall up to 1% AEP events) to minimise the impact of flooding outside the DE and receiving sensitive environments (Arup 2022).

Table 5: Structural control drainage features of the proposal

Structural Control	Drainage Feature	WSUD Function
Infiltration systems	Infiltration basins and trenches (vegetated)	Retain and treat road runoff with outflows up to 1% AEP
	Soakwell/permeable base pit/street gullies (not vegetated)	A grated hole in base slab on kerbed sections of road. Captures and infiltrates runoff to source maintaining hydrological regime.
Detention systems	Dry/ephemeral detention areas	Reduce the rate of stormwater runoff by temporarily holding rainfall runoff
Conveyance systems	Swales and buffer strips (vegetated)	Receive runoff from unkerbed sections of road for treatment, infiltration and conveyance to basins or culverts
	Bioretention systems (vegetated)	Receive excess runoff from piped networks
Pollution control	Baffled pits	Trap floating pollutants such as oils and petrol in the basin, preventing export from the road reserve
	Gross pollutant traps	Below ground concrete basin with weir and trash rack. Decreases inflow velocity to encourage sedimentation and trap coarse debris

2.5.2.1 Basins

The location and size of detention basins was determined through a preliminary DRAINS model which identified local catchment areas and basin storage requirements based on the increase in impervious area (from pre to post development) (Arup 2022). Basins are designed to attenuate post development runoff with outflows matching 1% AEP of pre-development flow rates.

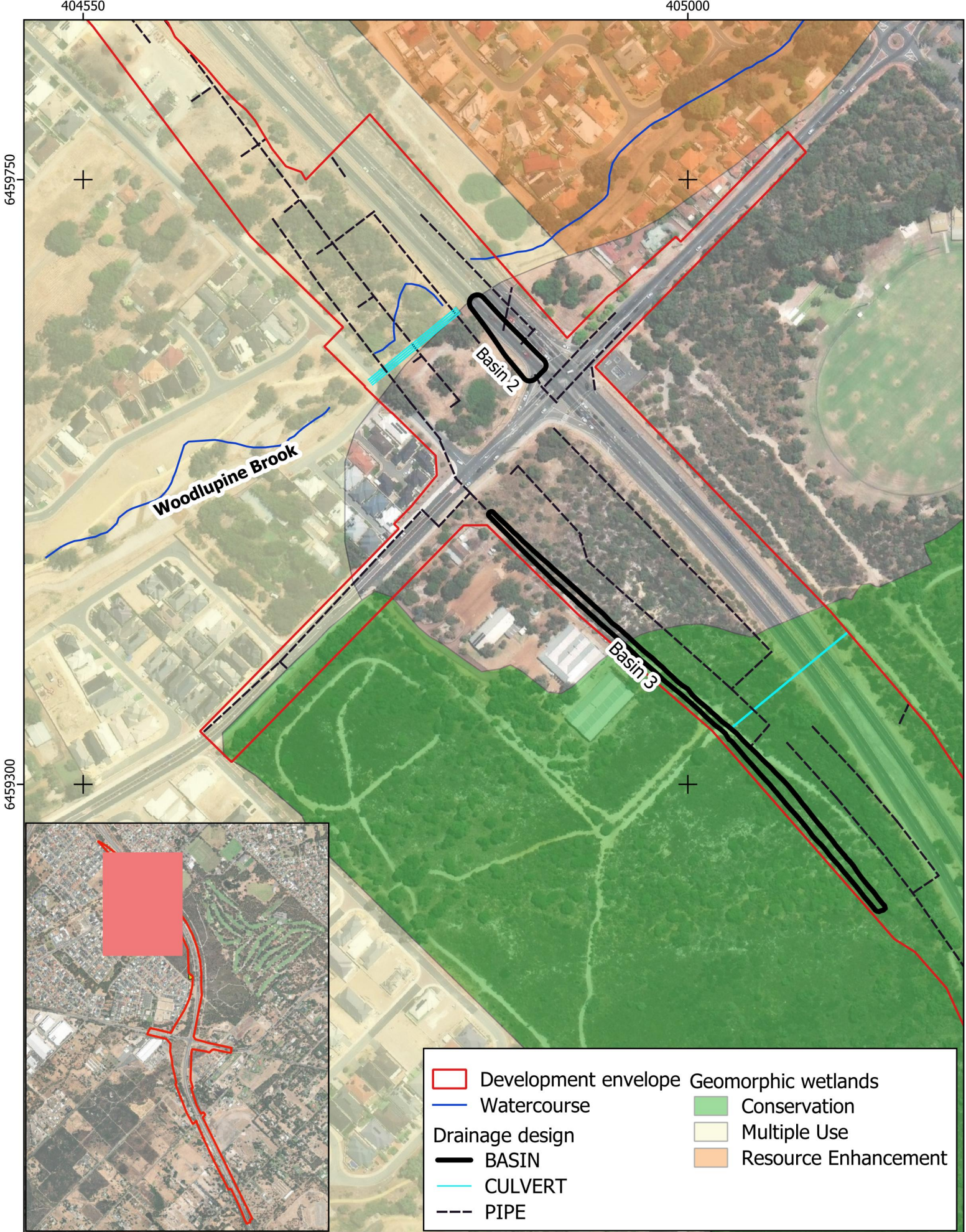
To promote at-source infiltration of stormwater, runoff captured within the drainage network will be conveyed to infiltration basins with permeable bases, constructed with porous, sand-based material (referred to as filter media). Runoff will be treated in bioretention basins landscaped with native vegetation to assist with nutrient stripping of stormwater during infiltration. Basin outflows will include baffles to trap hydrocarbons, preventing export of these pollutants from the road reserve to neighbouring vegetation communities.

Basin depths will be approximately 1.2 m, not exceeding 1.5 m and are not expected to intersect groundwater given the depth to groundwater across the development envelope ranges from approximately 4 mbgl (metres below ground level) at Hale Road and 6 mbgl at Welshpool Road (Main Roads 2024). Basin design is expected to maintain groundwater recharge without disrupting groundwater flow.

Where Tonkin Highway is un-kerbed, pavement runoff will discharge passively into the verge for infiltration and longitudinal conveyance to basins and/or transverse culverts. At intersections where kerbing is present a piped drainage network will convey runoff to a series of bioretention basins for treatment and at source infiltration (Arup 2022).

Table 6: Basin locations in relation to environmental values

Basin #	SLK	Enviro value	DMMP Figure
2	54.4	Woodlupine Brook	3
3	54.6	CCW15020 Hartfield Park / BF320 SCP10a	3
5	55.4		4
6	55.8	Yule Brook	4
7	55.9		4
8	56.1	GBSW BF387	5
9	56.7		5
10	57.2	N/A	5



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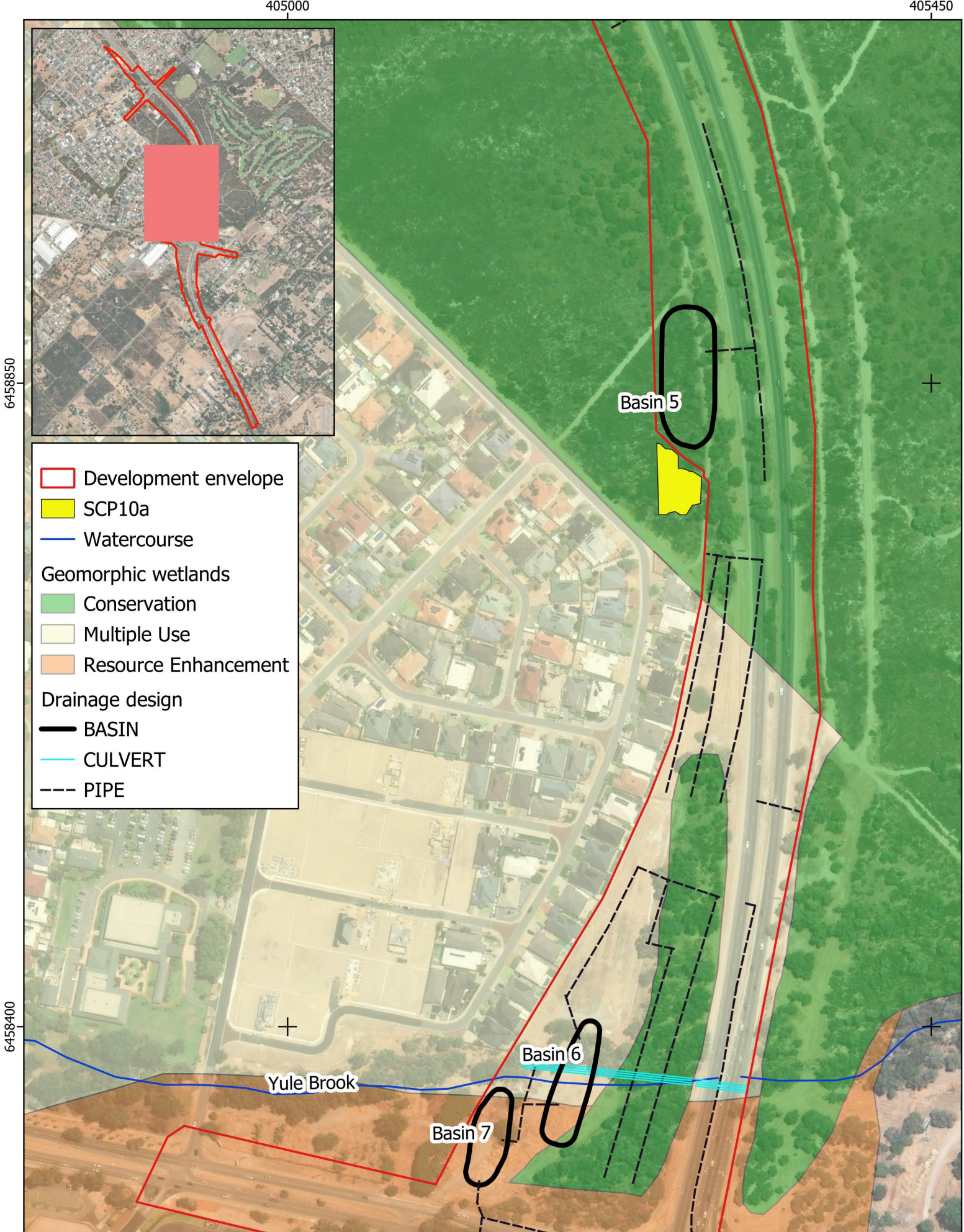
Figure 3: Drainage features in relation to key environmental values (north)

Tonkin Hwy grade separated interchanges
(Hale Rd and Welshpool Rd)
Drainage Management and Monitoring Plan



0 75 150 m

Base map © ESRI and its data suppliers. Landgate (2020)
CRS: GDA2020/MGA zone 50
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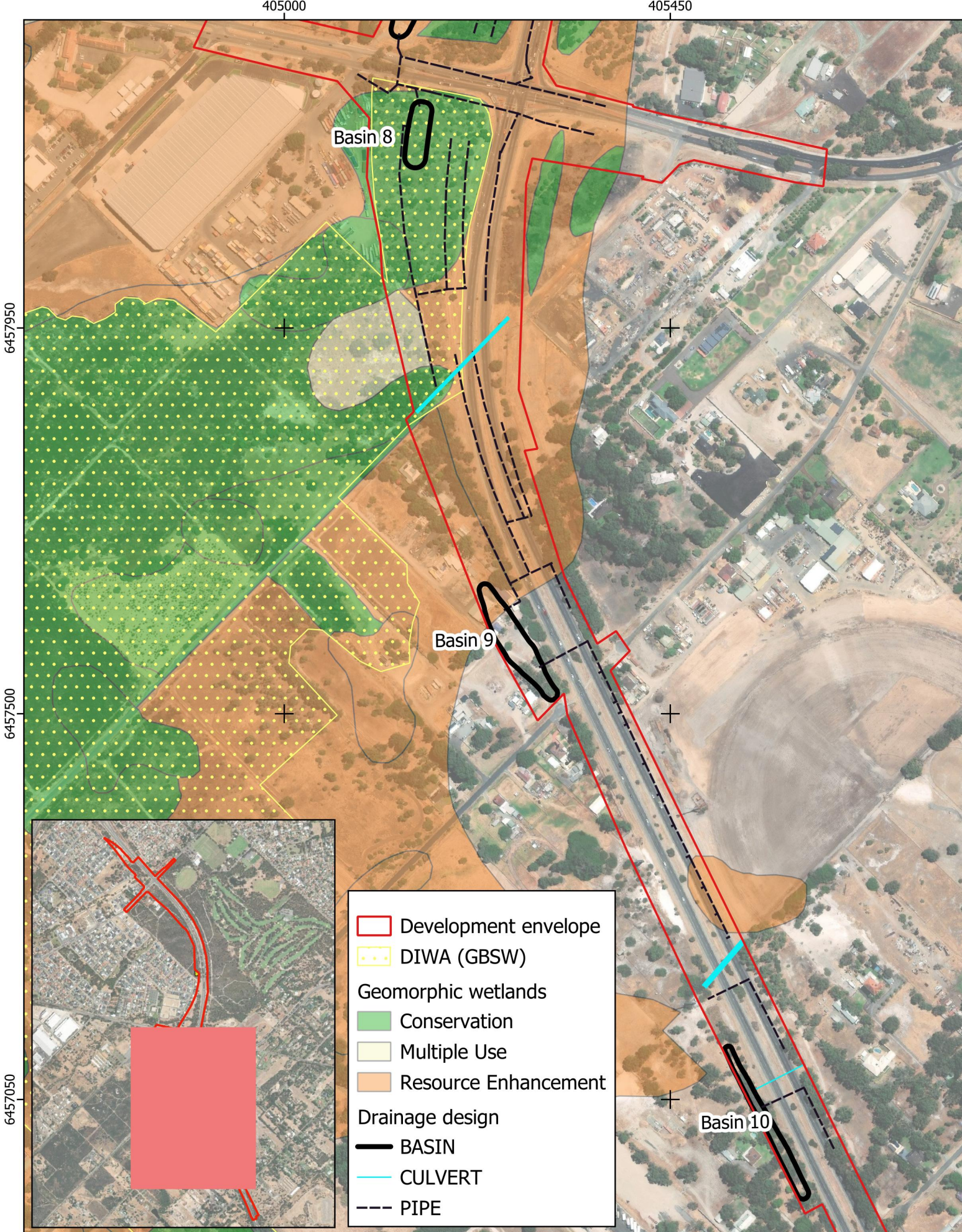
Figure 4: Drainage features in relation to key environmental values (central DE)

Tonkin Hwy grade separated interchanges
 (Hale Rd and Welshpool Rd)
 Drainage Management and Monitoring Plan



0 75 150 m

Base map © ESRI and its data suppliers. Landgate (2020)
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Figure 5: Drainage features in relation to key environmental values (south DE)

Tonkin Hwy grade separated interchanges
(Hale Rd and Welshpool Rd)
Drainage Management and Monitoring Plan



0 100 200 m

Base map © ESRI and its data suppliers. Landgate (2020)
CRS: GDA2020/MGA zone 50
Project ref: 262151
Date: 20/05/26 Author: CS

3 DMMP Components

Management targets and actions were selected to assess the effectiveness of the drainage system in minimising the impacts to key environmental values from potential changes in water quality and quantity attributable to the proposal.

3.1 Management Actions

The management actions in **Table 7** focus on minimising water quality and quantity impacts to wetlands adjacent to the DE and attributable to the road asset during and after construction. The drainage design promotes at source infiltration and treatment of stormwater runoff representing best management practice as outlined in *Stormwater Management Manual for WA, Chapter 9 Structural Controls* (DWER 2022).

The actions are prioritised, as determined in the ERD (Main Roads 2022), to align management effort to proposal activities that have the highest likelihood of causing environmental impact.

Table 7: Prioritised management actions

Potential Impact	Management Action
Water quality Water quantity	Construct infiltration basins, pits, detention basins and bioretention basins to the specifications and locations in Appendix A, making adjustments as necessary during construction to minimise impacts to wetlands adjacent to the DE. Infrastructure capable to manage volume from small frequent rainfall events (first 15mm of rainfall event) and 1% AEP events (flood mitigation).
	Construct vegetated swales and buffer strips parallel to the road asset along unkerbed sections to the specifications in Appendix A.
	Install baffles and gross pollutant traps at locations specified in Appendix A.
	Implement monitoring program in Table 8 to identify changes in groundwater level and quality from baseline concentrations.
	Construct new groundwater monitoring bores, making location adjustments as necessary to: - be as close as possible to baseline monitoring sites (Appendix C) - provide adequate monitoring of environmental values adjacent to the DE.
	Implement monitoring and maintenance program in Table 8 of drainage infrastructure to maintain performance and manage: - accumulation of target pollutants in basin base material - accumulated litter and debris in GPT and basins - sedimentation
	Implement contingency actions in Table 9 as required as identified in the monitoring and maintenance program.
	In areas of revegetation use local native species where appropriate and achieve completion criteria as specified by Main Roads in Specification 304 Revegetation (Main Roads 2025). Implement vegetation monitoring program for vegetated drainage features.
	During construction implement appropriate storage of potentially hazardous materials and provide provision on site for appropriate spill response.

3.2 Management Targets

The targets demonstrate integration of water sensitive urban design principles in the drainage design and function. This is consistent with requirement for WSUD in stormwater management under State Planning Policy 2.9 Water (WAPC 2025a) (which replaces Better Urban Water Management) and *Decision process for stormwater management in WA* (DWER 2017) which list WSUD principles in designing stormwater drainage as:

- Mimic natural hydrological processes
- Protect people and property from flooding
- Retain natural water bodies as receiving environments for runoff of suitable quality (minor and major rainfall events)
- Retain or plant local native species to reduce runoff volumes and peak flow rates
- Implement management and maintenance to prevent, reduce and treat runoff pollutants
- Design systems that achieve good urban amenity and provide multiple functions.

Target 1: Water quality: Water quality of wetlands adjacent to the DE does not change from baseline attributable to the road asset during or after construction.

Target 1 assesses the effectiveness of drainage infrastructure at treating stormwater runoff and removing target pollutants prior to runoff recharging to groundwater and potentially entering wetlands adjacent to the DE.

Target 2: Water quantity: The hydrological regime of wetlands adjacent to the DE does not change from baseline attributable to the road asset during or after construction.

Target 2 will maintain the existing groundwater rainfall recharge rate across the DE. Stormwater runoff will be disbursed to adequately sized and strategically located infiltration basins and permeable base pits to facilitate even infiltration to groundwater across the DE.

Target 3: Revegetation: Local native vegetation is utilised where appropriate to reduce stormwater runoff flow rate, promote at source infiltration and mitigate water quality impacts.

Revegetation success within the drainage system will maximise the effectiveness of basins, swales and buffers in trapping gross pollutants (litter), removing sediment, hydrocarbons and heavy metals. Vegetation also reduces peak runoff flow rate and velocity and promotes infiltration at source.

Target 4: Flood mitigation: Runoff volumes generated from infrequent large rainfall events up to 1% AEP are effectively managed by the drainage infrastructure, minimising the impact on the hydrological regime of wetlands adjacent to the DE from these events.

Target 4 ensures that the drainage design is capable to manage stormwater runoff generated from infrequent high rainfall events, and runoff volumes greater than that generated from frequent small rainfall events.

3.3 Monitoring Program

Under condition C2-1(2) of MS 1249, the proponent must continue to implement the DMMP and monitoring program until it has been demonstrated that the environmental objective has been met.

The monitoring program consists of three components; groundwater (level and quality), infiltration basin condition and drainage infrastructure maintenance. The program, detailed in Table 8, is proposed to begin preconstruction to obtain baseline basin sediment data and supplementary baseline groundwater data. New groundwater monitoring sites, to replace those that will be

destroyed during construction, will be located as close as practicably possible to the baseline groundwater monitoring sites (Appendix C). Additional sites will be established where gaps in monitoring are identified near key environmental values, such as near Basin 5 and SCP10a.

The monitoring program and methods have been developed in accordance with regulatory guidelines and standards, including:

- Department of Water Field sampling guidelines: A guide for field sampling and surface water quality monitoring programs (DOW, 2009)
- Australian Standard AS 5667.11:1998 Water Quality Sampling – Guidance on Sampling of Groundwaters.
- Department of Water Field sampling guidelines: A guide for field sampling and surface water quality monitoring programs (DOW, 2009)
- Main Roads Western Australia (2025). Specification 304 Revegetation. Main Roads Western Australia, Perth, WA.
- Adoption Guidelines for Stormwater Biofiltration Systems (Payne et al. 2015)
- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPC 2013)

The monitoring methods outlined in Table 8 include groundwater sampling, basin sediment sampling and visual observation. Samples will be collected for in-field and laboratory analysis to identify changes from baseline in the concentration level of target pollutants:

- sediment/total dissolved solids
- heavy metals
- hydrocarbons/oil/grease
- inorganic constituents (minerals and metals)
- gross pollutants

Monitoring results will be compared to baseline data collected pre-construction to identify change, and the potential cause, in groundwater quality and groundwater level.

In addition, monitoring of drainage infrastructure will be conducted to confirm it is functioning as expected. Monitoring will consist of visual observation to identify issues with infrastructure such as sedimentation, blockages, litter and standing water beyond expected durations following rainfall events.

Monitoring of re-vegetation associated with the drainage infrastructure will be through visual observation. The objective of the monitoring is to confirm native species have established and weed presence is low. Monitoring will assess vegetation composition against guidelines for suitable proportion of native species and weed species (Main Roads 2025).

Table 8: Monitoring program

EPA factor and objective: Inland Waters. To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected						
Environmental Objective MS 1249 Condition B3-2(1) Minimise impacts to the hydrological regime and water quality of wetlands adjacent to the development envelope						
Key environmental values: Wetlands adjacent to the development envelope						
Duration MS 1249 Condition C2-1(2) Beginning pre-construction, continuing until it is demonstrated the environmental objective has been met						
Management Target	Management Action	Monitoring Method	Parameter	Timing/Frequency	Location	Contingency Action Indicator
Water Quality	Groundwater quality monitoring program	Groundwater sample. In-field analysis using multiparameter water meter. Collection for laboratory analysis.	Target pollutants - sediment/total dissolved solids - heavy metals - hydrocarbons/oil/grease - inorganic constituents (minerals and metals) - gross pollutants	Monthly during construction Quarterly during operation	Groundwater monitoring bores	Concentration of target pollutants are outside of baseline range
	Drainage infrastructure maintenance program	Visual inspection of basins and drainage infrastructure	Evidence of: - Litter/debris - Flocculants - Oils/grease	Quarterly during operation	GPTs Swales Buffers Basins 2, 3, 5, 6, 7, 8, 9	Litter visible, reduced visual amenity, blockage of inlet or outlet.

Management Target	Management Action	Monitoring Method	Parameter	Timing/Frequency	Location	Contingency Action Indicator
						Evidence of litter export to wetlands outside the DE. Evidence of floating oil/grease or on baffles.
Water Quantity	Groundwater level monitoring program	Water level meter	Groundwater level	Quarterly preconstruction Quarterly during operation	Groundwater monitoring bores	Groundwater level is outside of baseline range
	Drainage infrastructure maintenance program	Visual inspection of basins and drainage infrastructure	Evidence of: - Ponding water - Inflow and outflow blockages - Sedimentation - Erosion or instability	Monthly during construction Quarterly during operation	GPTs Swales Buffers Basins 2, 3, 5, 6, 7, 8, 9	Standing water present 72 hours post storm events Blockage of inlet or outlet Evidence of sedimentation and/or erosion
	Drainage infrastructure monitoring program	Collect sediment sample in basin at 10cm depth: - 3 collection points for basins with surface area <50m² - Add extra collection point for every	Target pollutants - sediment/total dissolved solids - heavy metals - hydrocarbons/oil/grease	Sample basin sediment immediately post construction. Annually, August during operation.	Basins 2, 3, 5, 6, 7, 8, 9	Concentration of target pollutants are outside range for infiltration basin sediment

Management Target	Management Action	Monitoring Method	Parameter	Timing/Frequency	Location	Contingency Action Indicator
		additional 100m ² basin surface area	- inorganic constituents (minerals and metals) - gross pollutants			
Revegetation	Implement revegetation monitoring program	Visual inspection of vegetated areas of the drainage system.	- % native vegetation cover - % weed cover - weed species	Annually (spring)	Basins Swales Buffers	Low % native vegetation cover High % weed cover Weed of high priority identified (Main Roads (2025))
Flood Mitigation	Construct infiltration basins to manage 1% AEP event	Visual observation	Evidence of: - erosion or instability - clogging or sedimentation - standing water	Annually (winter) Post 1 EY events	Basins 2, 3, 5, 6, 7, 8, 9	Standing water 72 hours post storm event Accumulated sediment Erosion, wall collapse

3.4 Contingency Actions

If monitoring identifies an indicator is out of the range specified in Table 8, contingency measures will be implemented as detailed in Table 9.

When indicators are outside the baseline range and contingency measures are implemented to mitigate impacts, these events will be reported in an annual Compliance Assessment Report (Section 3.5).

Table 9: Contingency measures

Environmental Value	Indicator	Contingency Measures
Groundwater quantity/level	Groundwater level is outside baseline range	1. Compare against rainfall recorded for year. If change is related to below average rainfall no further action required. If not, further investigation required. 2. Investigate functioning of drainage infrastructure within development envelope. Have basin condition monitoring indicators been met. 3. Investigate possible cause including other changes in the catchment such as change in drainage infrastructure outside development envelope that may have impacted groundwater level. 4. If no cause is identified, implement remedial actions such as review stormwater system, performing maintenance activities, installing additional monitoring bores. 5. Continue to monitor groundwater level and the effectiveness of remedial actions.
	Ponding water in basins 72 hours after 1 EY event	1. Identify cause. Perform maintenance as required: - scarifying the base of basin between plants - increase planting density to break up the clogging layer - remove sediment - unblock inlet/outlets 2. Continue monitoring until indicator is back within range. If problem persists, consider modifications to stormwater system.
	Inflow/outflow blockage Sedimentation	
	Basin erosion, instability or damage	1. Restore eroded areas with media, soil or vegetation. 2. Restore damaged areas/infrastructure. 3. Consider signage, fencing, bollards etc if problem persists.

Environmental Value	Indicator	Contingency Measures
Groundwater quality	Concentration of target pollutants are outside baseline range of groundwater	1. Determine if upgradient water quality is also outside baseline range. 2. Resample inflow and outflow sites for 7 consecutive days following original sampling event, noting target pollutant concentrations 20% above baseline.
	Concentration of target pollutants are outside range for infiltration basins	3. Determine if stormwater system is the source and remediate if required until trigger value is no longer being exceeded. 4. If the stormwater system is the source, perform remedial action such as cleaning out of GPTs and oil baffles and/or increasing vegetation density within the basins, swales and buffers. 5. Continue monitoring groundwater quality and the effectiveness of remedial actions until concentrations are within baseline range.
	Accumulation of litter and debris/visual amenity issues/clogging inflow or outflow/export of litter outside DE	1. Identify source or location where access occurred. 2. Remove material from affected area. 3. Clean out upstream GPT. 4. Thin vegetation at inlet area if required 5. Continue monitoring until trigger value is no longer being exceeded. If problem persists, consider modifications to stormwater system (e.g. change inlet design).
	Native vegetation cover less than 80% on revegetated areas	1. Identify cause (water stress, appropriate species, disease, nutrients, pests, weeds). 2. Implement remedial actions: replant, increase watering, fencing, soil testing, remove invasive species, remove green waste.
	Weed cover greater than 10% of basin Weeds of high priority identified	1. Identify weed species, location and coverage. 2. Commence targeted weed control, remove weeds and green waste.

3.5 Reporting

The failure to achieve an environmental objective, or implement a management action, regardless of whether the contingency measures have been or are being implemented represents a non-compliance with the condition in MS1249.

In accordance with Part D of MS1249, where a potential non-compliance occurs the proponent will:

- Report this to the CEO within seven (7) days
- Implement contingency measures in Table 9
- Investigate the cause
- Investigate environmental impacts
- Advise rectification measures to be implemented
- Advise any other measures to be implemented to ensure no further impact
- Provide a report to the CEO within twenty-one (21) days of being aware of the potential non-compliance, detailing the measures required in the conditions listed above.

An annual Compliance Assessment Report (CAR) will be provided to the CEO for the purpose of determining whether the implementation conditions are being complied with.

The first annual CAR must be submitted by November 2026 i.e. within fifteen (15) months of the date of MS1249 of August 2025, and subsequent reports must be submitted annually from that date.

Reporting for the DMMP, to be incorporated into the annual CAR, will include:

- Monitoring results and tracking against management targets
- Implementation of management actions including revisions as necessary
- Implementation of contingency measures and outcomes
- Adaptive management changes to the monitoring program.

4 Adaptive Management and Review

The DMMP will be reviewed annually and updated as necessary to capture new knowledge and changing conditions associated with the proposal. Changes to drainage management will take into consideration additional baseline data, monitoring results, changes in construction or operation and implemented contingency measures.

All proposed amendments to the DMMP will be recorded in the **Changes to DMMP** table (Appendix D) and be undertaken in accordance with Part C (C2) conditions in MS1249.

5 Stakeholder Consultation

The Environmental Review Document for the proposal was made available for a six-week public comment period from 3 October 2022 and closed on 13 November 2022. The Response to Submissions report (Main Roads 2024) provides the proponents response to submissions made by the public (and the Environmental Protection Authority) on the proposal.

The proponent undertook stakeholder consultation for the proposal between 2019 to 2021 which included engagement with the wider community and is ongoing with landowners on request (Main Roads 2022).

In 2025 and 2026 Main Roads consulted and received advice from Department of Water and Environmental Regulation on components of the DMMP to ensure the plan meets the condition requirements in MS1249.

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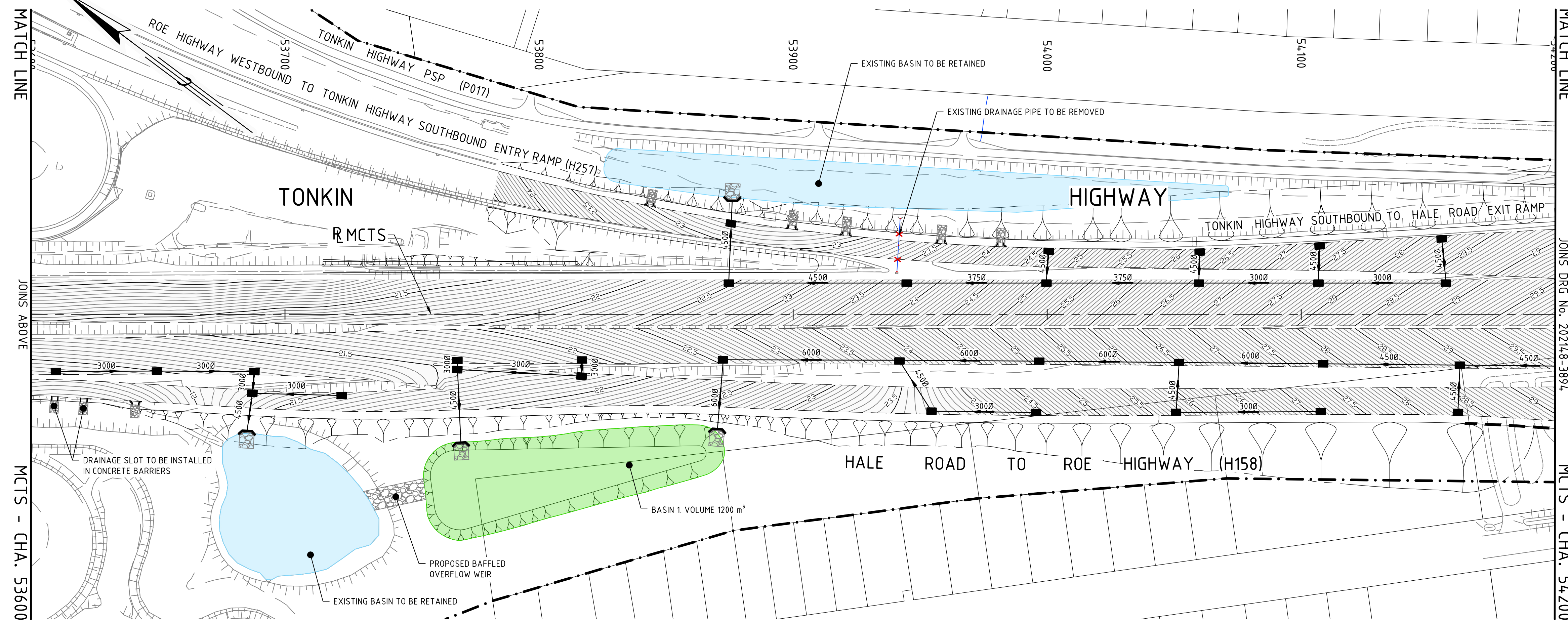
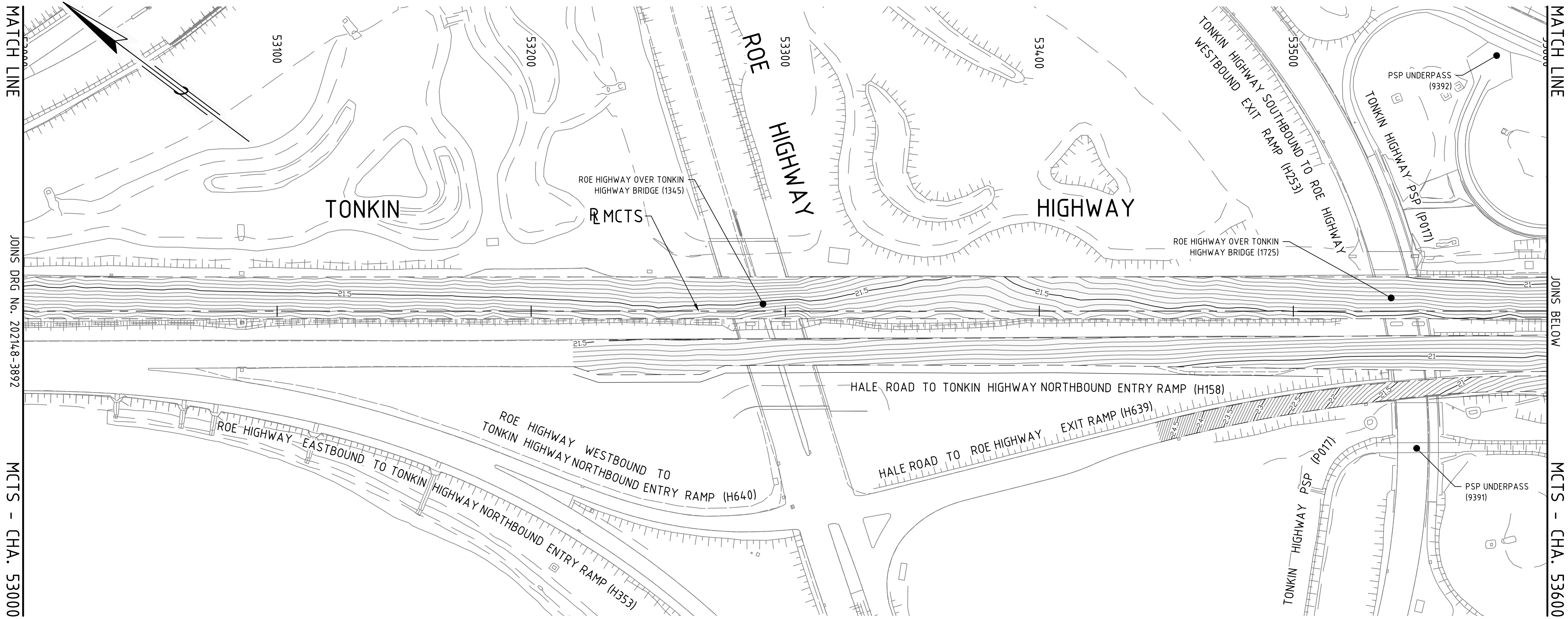
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Appendix A: Technical Drainage Design

6 technical drawings



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HALE ROAD (1020006) TO WELSHPOOL ROAD EAST (H027)	
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DRAINAGE STRATEGY	
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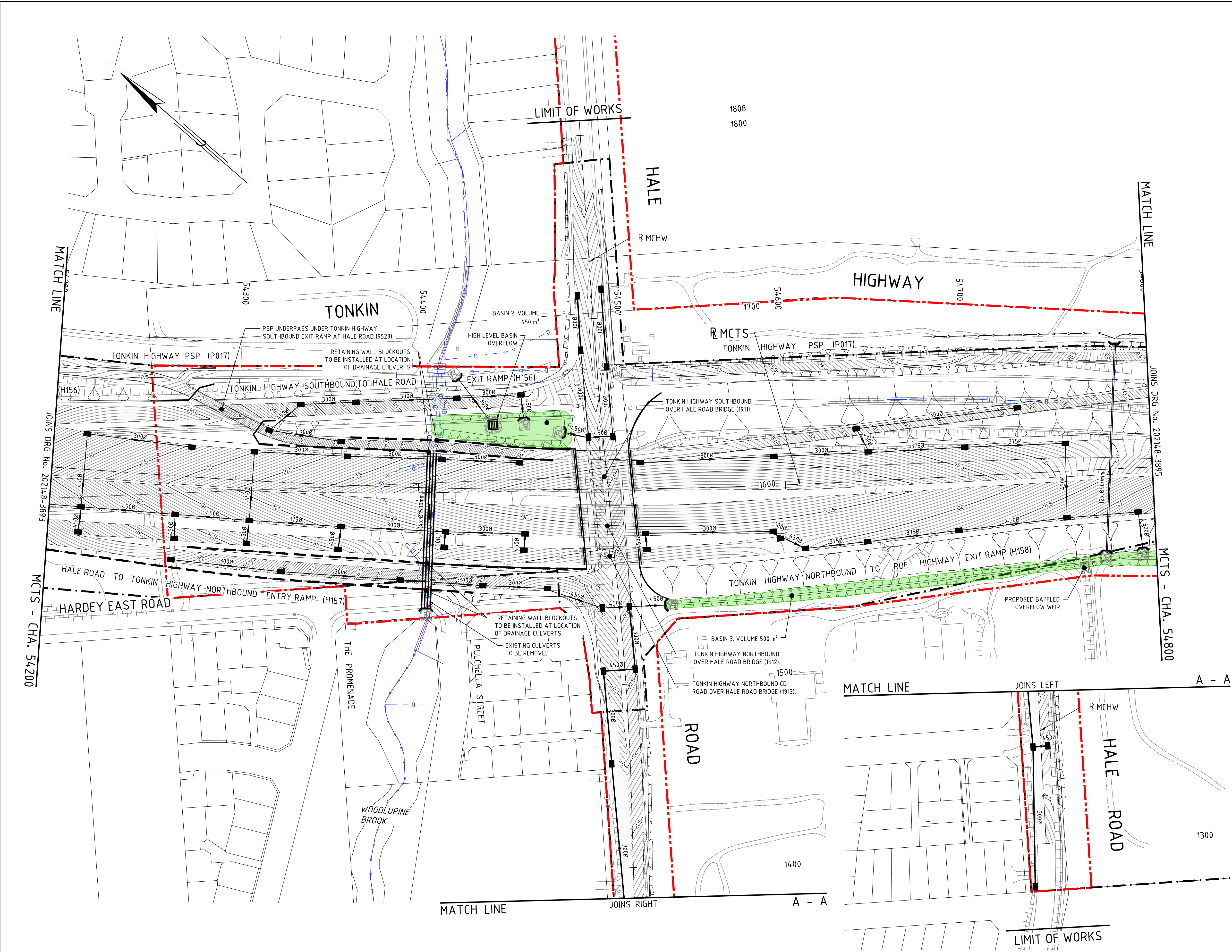
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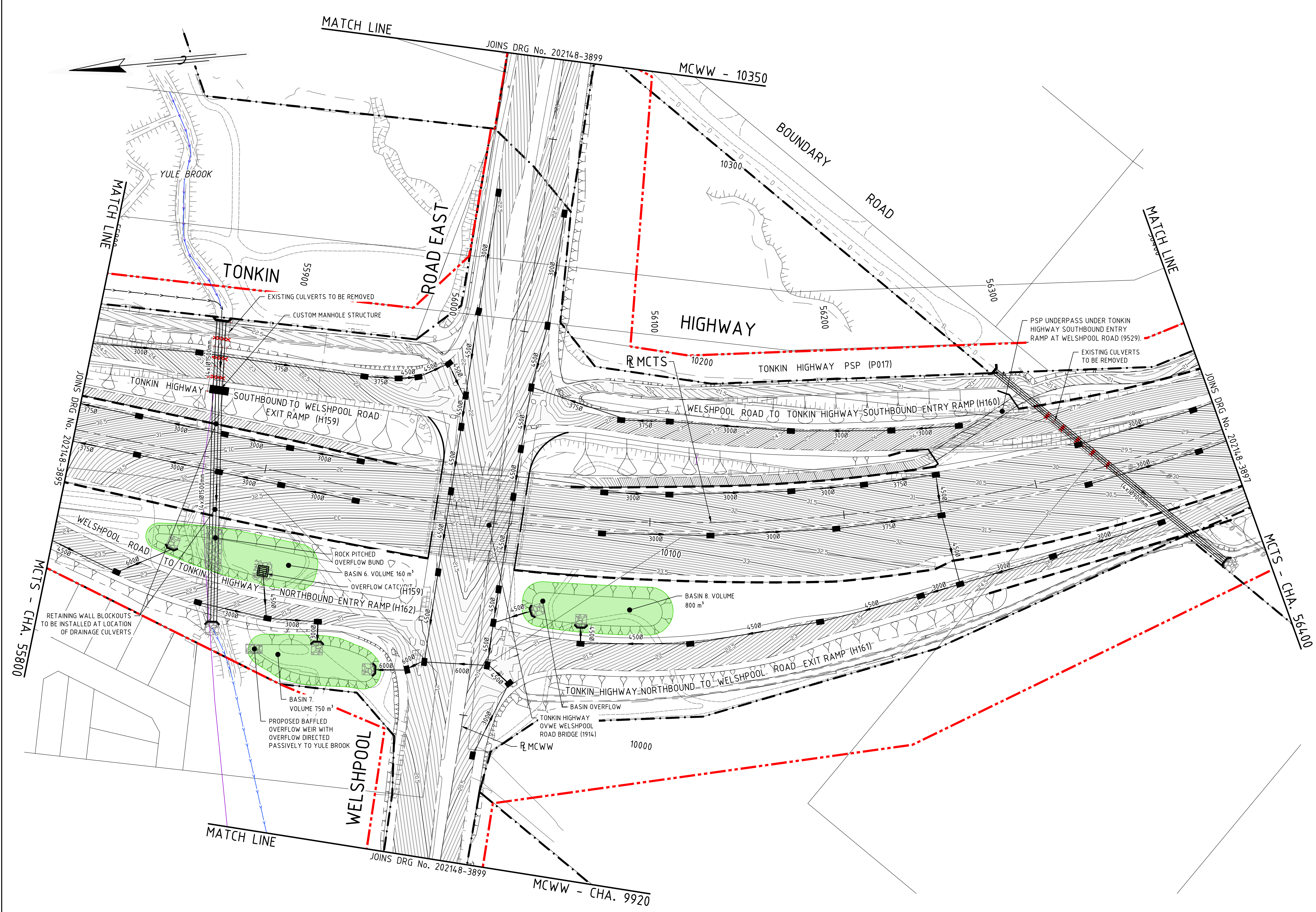
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B	ISSUED FOR FINAL 15% REFERENCE DESIGN	E. MAKITA	13.08.2021
A	ISSUED FOR DRAFT 15% REFERENCE DESIGN REVIEW	E. MAKITA	04.06.2021
No.	DESCRIPTION	APPROVED & DATE	
AMENDMENTS			

**CONCEPT DESIGN
DRAWING**

METADATA	
GROUND SURVEY STANDARD:	67-08-43
DATE OF CAPTURE:	APRIL 2019
MAPPING SURVEY STANDARD:	-
DATE OF CAPTURE:	-
MAIN ROADS PROJECT ZONE:	PCG94
HEIGHT DATUM:	AHD71

ARUP

Level 14, Exchange Tower,
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Member Firm
Arup Pty Ltd
ABN 18 000 966 165

DRAWN	A. SAKIDIN	31.05.2021
DESIGNED	M. STOVOLD	24.05.2021
VERIFIED		
DIRECTOR		
CLIENT FILE NO.	19/678	

mainroads
WESTERN AUSTRALIA

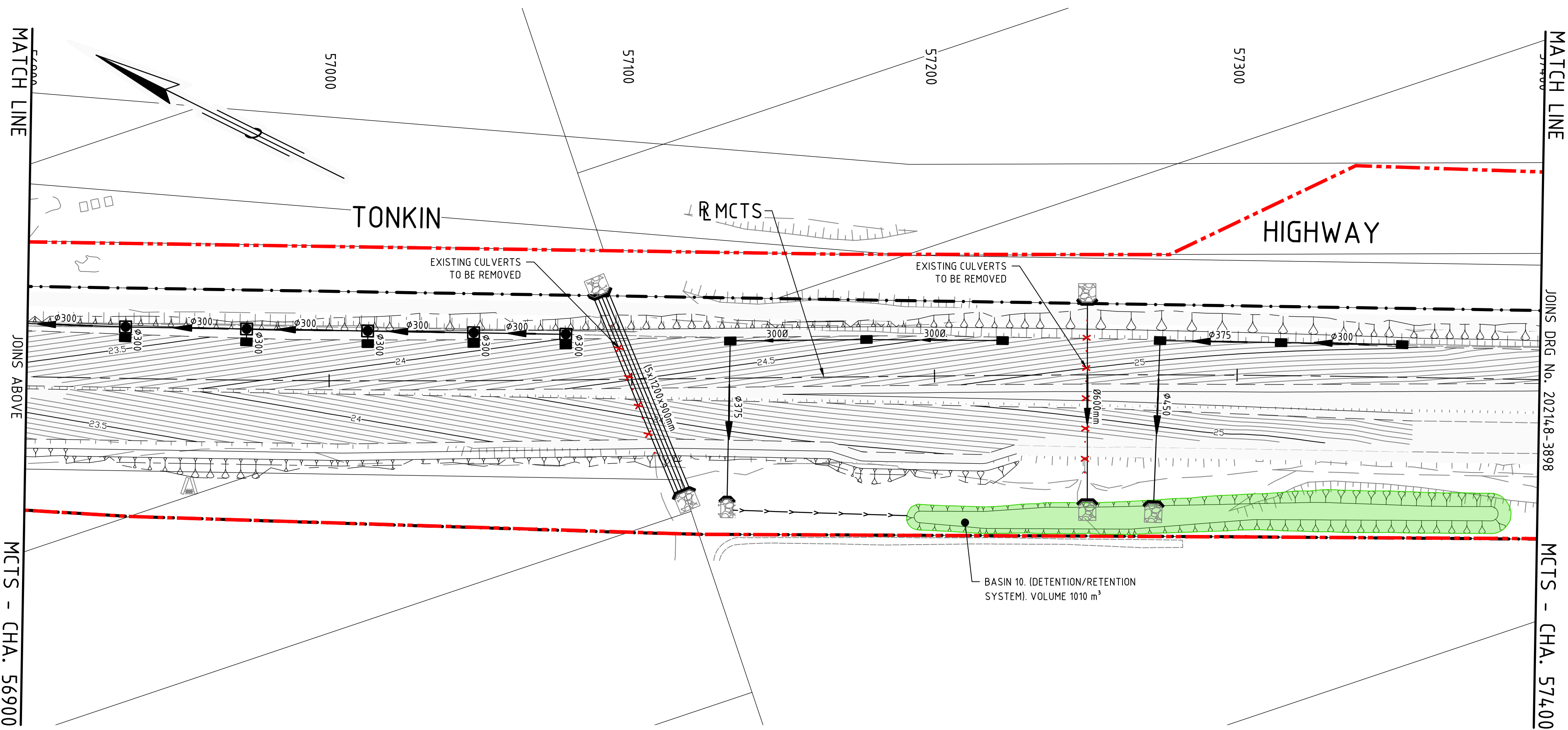
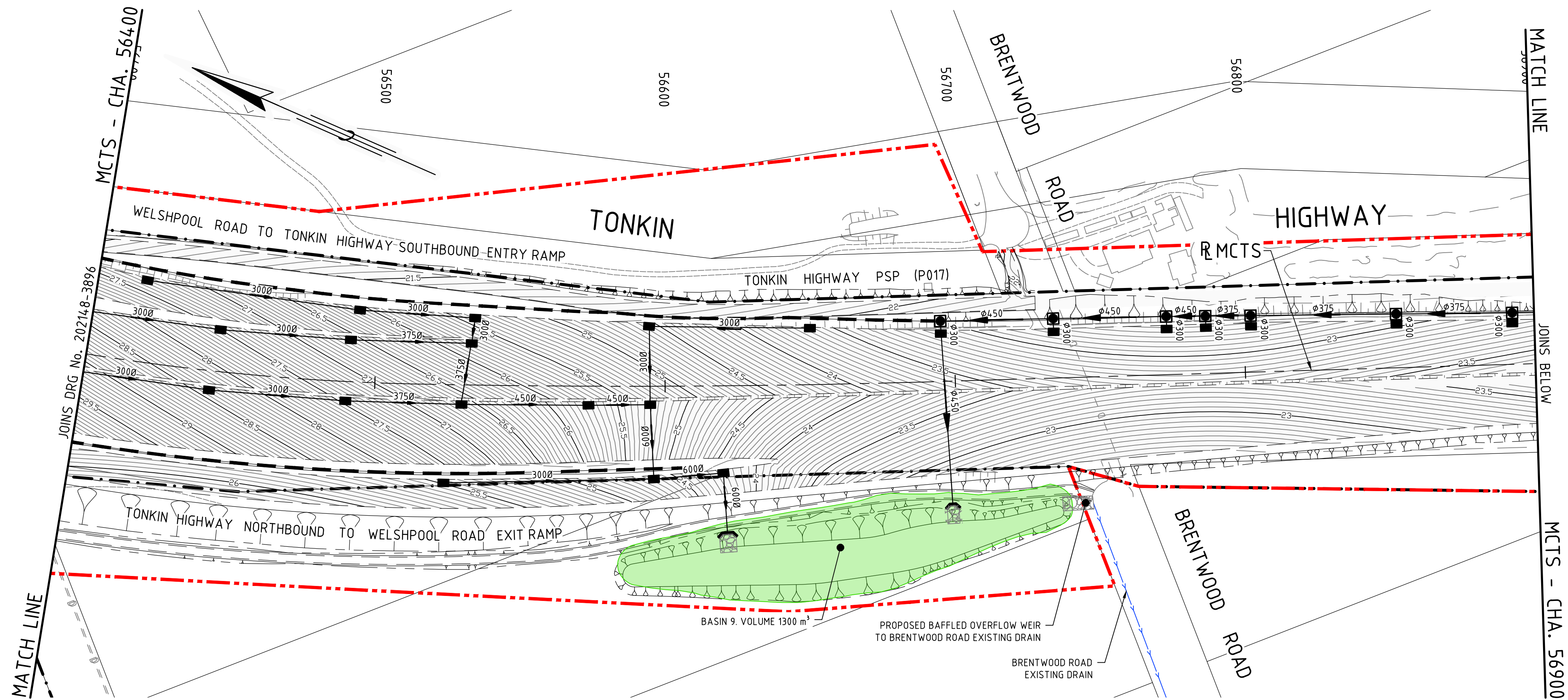
PLANNING AND TECHNICAL SERVICES DIRECTORATE
ROAD PLANNING AND DEVELOPMENT

WATERLOO CRESCENT
Telephone 13 81 38

EAST PERTH WA 6004
Fax (08) 9323 4430

TONKIN HIGHWAY (H017)	
HALE ROAD (1020006) TO WELSHPOOL ROAD EAST (H027)	
PROJECT CASE - SLK 52.73 TO SLK 57.75	
DRAINAGE STRATEGY	
SHEET 5 OF 8	
LOCAL AUTHORITY	(102) CITY OF KALAMUNDA
DRAWING NUMBER	202148-3896-D

1:1000
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NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE MRWA SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. ROCK PITCHING TO ALL CULVERT OUTLETS TO EXTEND TO BOTTOM OF TABLE DRAIN.
4. ALL CULVERTS ARE CLASS 2 UNLESS OTHERWISE NOTED.

LEGEND:

- EXISTING CADASTRAL BOUNDARY
- EXISTING MRS BOUNDARY
- APPROVED ENVIRONMENTAL CLEARING AND DEVELOPMENT BOUNDARY
- PROPOSED CARRIAGEWAY EDGE - KERBED
- PROPOSED CARRIAGEWAY EDGE - UNKERBED
- PROPOSED RETAINING WALL
- PROPOSED BATTERS
- PROPOSED OPEN DRAIN / SWALE
- PROPOSED DRAINAGE PIPE
- PROPOSED PAVEMENT CONTOURS
- PROPOSED DRAINAGE FLOW
- PROPOSED HEADWALL
- PROPOSED SIDE ENTRY/GULLY PIT
- PROPOSED ROCK PROTECTION
- PROPOSED KERB OPENING BATTER DRAIN
- PROPOSED BIORETENTION BASIN / SWALE
- EXISTING BIORETENTION BASIN / SWALE
- EXISTING OPEN DRAIN / SWALE
- EXISTING DRAINAGE
- EXISTING DRAINAGE TO BE REMOVED

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FILE LOCATION J:\272000\272867-00\1\202148-3897.dwg

DRAWN	A. SAKIDIN	31.05.2021
DESIGNED	M. STOVOLD	24.05.2021
VERIFIED		
DIRECTOR		
CLIENT FILE NO.	19/678	

PLANNING AND TECHNICAL SERVICES DIRECTORATE
ROAD PLANNING AND DEVELOPMENT

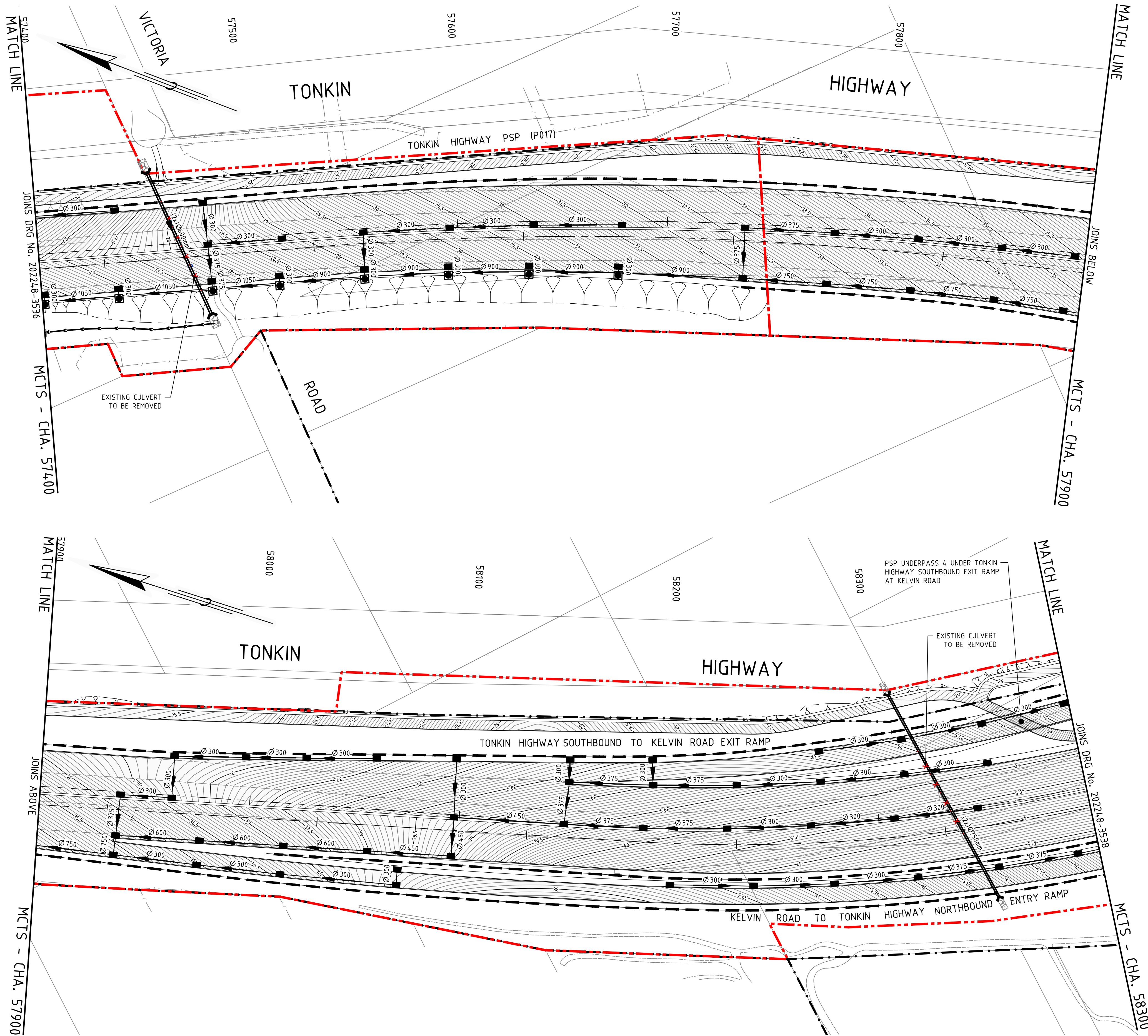
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TONKIN HIGHWAY (H017)

HALE ROAD (1020006) TO WELSHPOOL ROAD EAST (H027)
PROJECT CASE - SLK 52.73 TO SLK 57.75
DRAINAGE STRATEGY
SHEET 6 OF 8

LOCAL AUTHORITY (102) CITY OF KALAMUNDA
DRAWING NUMBER
202148-3897-D



- NOTES:**
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CONCEPT DESIGN DRAWING		METADATA GROUND SURVEY STANDARD: 67-08-43 DATE OF CAPTURE: APRIL 2019 MAPPING SURVEY STANDARD: - DATE OF CAPTURE: - MAIN ROADS PROJECT ZONE: PCG94 HEIGHT DATUM: AHD71		ARUP Level 14, Exchange Tower, 2 Esplanade, Perth, WA 6000, Australia Tel: +61 (0)8 9327 8300 www.arup.com Member Firm Arup Pty Ltd ABN 18 000 906 165	DRAWN G. CLARKE 08.04.2022 DESIGNED M. STOVOLD 25.03.2022 VERIFIED DIRECTOR CLIENT FILE NO. 19/678		 PLANNING AND TECHNICAL SERVICES DIRECTORATE ROAD PLANNING AND DEVELOPMENT WATERLOO CRESCENT Telephone 13 81 38 EAST PERTH WA 6004 Fax (08) 9323 4430	TONKIN HIGHWAY (H017) KELVIN ROAD (0077) PROJECT CASE - SLK 56.73 TO SLK 59.77 DRAINAGE STRATEGY SHEET 2 OF 4 LOCAL AUTHORITY (102) CITY OF KALAMUNDA, (104) CITY OF GOSNELLS DRAWING NUMBER 202248-3537-A	
A ISSUED FOR DRAFT 15% REFERENCE DESIGN REVIEW E. MAKITA 14.04.2022 No. DESCRIPTION APPROVED & DATE AMENDMENTS									

Appendix B: Mitigation and Management measures in ERD



Inland Waters management

EPA factor: Inland Waters

EPA objective: To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.

Proposal objective: To minimise as far as practicable the direct and indirect impacts to inland waters from the Proposal.

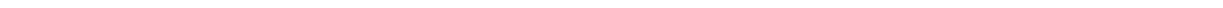
Key environmental values: Watercourses and wetlands, including Conservation Category Wetlands.

Key impacts and risks: Loss of wetland areas, degradation of drainage lines, changes to ecological regimes and contamination of surface or groundwater.

Management targets or indicators	Management or response actions	Monitoring	Timing/Frequency	Reporting	Corrective action trigger	Corrective actions	Corrective action responsibility
Prevent impacts to adjacent watercourses and wetlands (including CCW).	Stormwater drainage will be designed to best practice consistent with the BUWM and WASMM.	Review detailed drawings showing stormwater drainage design.	During design phase.	Record of detailed drawing review.	Design review identifies design is not undertaken in accordance with BUWM and WASMM.	Design reviewed and corrected.	Main Roads Superintendent.
	Sediment and Erosion - Stabilise road batters and open drains. - Install temporary erosion and sediment control measures to effectively control site drainage, soil erosion and sediment runoff. - Prepare and implement rehabilitation and landscaping so that roadsides and medians will be vegetated and act as a biological filter for run-off. - Landscaping to be undertaken progressively after construction is complete at each location.	Visual inspection, pedestrian walkthrough.	During construction. Monthly inspection. Inspection within 24 hours of major storm events or 48 hours if over a weekend.	Monthly site inspection reports. Report of erosion or scour events.	Batters and drains are unstable/not stabilised. Evidence of erosion observed in adjacent areas. Landscaping not undertaken in required areas.	Environmental incident will be recorded and the cause investigated. Stabilise slopes, batters and drains through replacement of material. Backfill rills and scours, remove deposited soil and reinstate the landscape treatment. Undertake landscaping.	Construction Contractor. Environmental Management Representative. Main Roads Superintendent.
	If construction dewatering is required, groundwater modelling will be undertaken to estimate the cone of depression and identify watercourses and wetlands that may be impacted, which will be monitored and managed to prevent impacts.	Groundwater bore upgradient at boundary of watercourses, wetlands and/or vegetation.	Prior to and during dewatering. Weekly GWL measurement	Groundwater modelling report/mapping. Groundwater level monitoring reports/records. RIWI permit.	GWL falls below modelled cone of depression as a direct result of water abstraction.	Cease water abstraction and implement remedial measures (e.g. infiltration trenches, diaphragm walls) to restore groundwater levels to pre-construction levels.	Construction Contractor. Environmental Management Representative.
Prevent contamination from accidental hydrocarbon and chemical spills	Develop and implement a Spill Response Procedure for hazardous material spill events to ensure any spill is contained effectively and cleaned up appropriately.	Environmental audit. Environmental incident reporting.	Prior to staff/contractors commencing on site. Clean up following a spill	Environmental audit report. Environmental incident reporting.	No Spill Response Procedure. Spill not remediated and reported.	Spill Response Procedure developed and approved. Corrective training. Remediation of spills once identified. Report to DWER Pollution Control and Response if event is considered to be a pollution event (off-site).	Construction Contractor. Environmental Management Representative. Main Roads Superintendent.
	On-site storage of wastes, fuels and chemicals will be minimised as far as practicable.	Visual inspection, pedestrian walkthrough.	During construction. Monthly inspection. Inspection within 24 hours of major storm	Monthly site inspection reports. Report of spills/contamination.	Contamination resulting from project identified in weekly inspection or following storm or hydrocarbons stored within no-go zones	Corrective actions as per the Spill Response Procedure including site remediation as needed. Incident report undertaken including preventative or procedural actions to prevent future spills.	Construction Contractor. Environmental Management Representative.
	Hydrocarbon storage and re-fuelling will not be permitted within 50 m of Woodlupine Brook						

Management targets or indicators	Management or response actions	Monitoring	Timing/Frequency	Reporting	Corrective action trigger	Corrective actions	Corrective action responsibility
	and Yule Brook or CCW (no-go zones).		events or 48 hours if over a weekend.				
	Vehicles and plant will not be left unattended when re-fuelling.						
	Storage of hydrocarbons on site will be within suitably designed containers within a bunded area.						
	Storage of chemicals in accordance with Safety Data Sheets (SDS).						
	Construction wastes will be appropriately stored and handled to minimise spills and leaks.						
	All contaminated material generated from spill response will be disposed off-site at an appropriately licensed waste facility.						

Appendix C: Figure A1 baseline groundwater monitoring sites



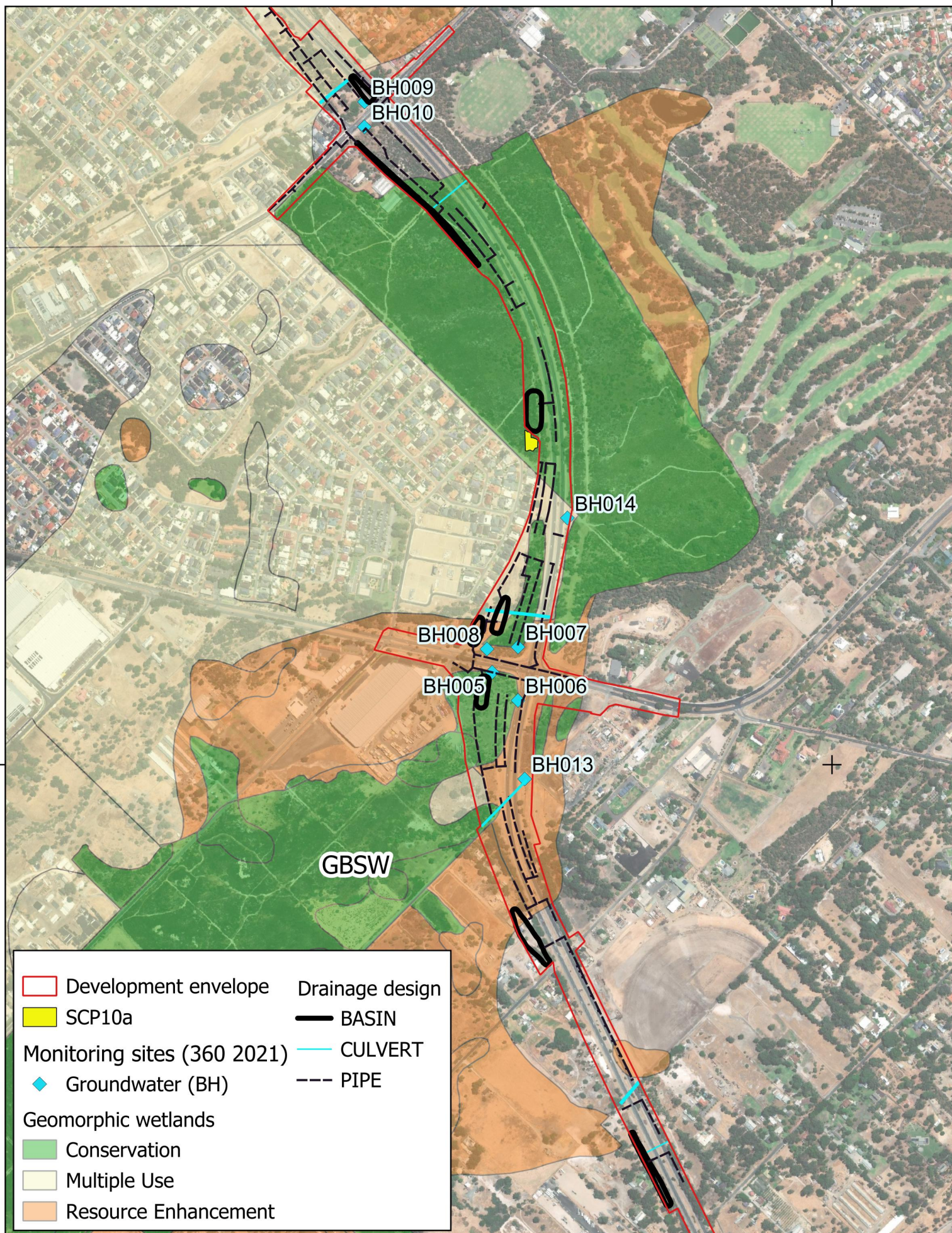


Figure A1: Baseline groundwater monitoring locations

Tonkin Hwy grade separated interchanges
(Hale Rd and Welshpool Rd)
Drainage Management and Monitoring Plan



0 0.25 0.5 km

Base map © ESRI and its data suppliers. Landgate (2020)
CRS: GDA2020/MGA zone 50
Project ref: 242142
Date: 25/06/26 Author: CS



Stream Environment and Water

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Appendix D: Changes to DMMP Table

Template Table: Changes to EMP.

As provided in EPA Environmental Management Plans Template Attachment 3

Complexity of changes:					Minor revisions	☐	Moderate revisions	☐	Major revisions	☐		
Number of Key Environmental Factors:					1	☐	2-3	☐	> 3	☐		
Date revision submitted to EPA:					DD/MM/YYYY							
Proponent's operational requirement timeframe for approval of revision					< One Month	☐	< Six Months	☐	> Six Months	☐	None	☐
Reason for Timeframe:												
Item no.	EMP section no.	EMP page no.	Summary of change	Reason for change								
1.												
2.												
3.												