



Swan Valley

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Assessment Current State of Traffic Modelling Swan Valley

February 2024

Summary

This report was written after new different traffic modelling in the Swan Valley information was received. The new information was assessed and combined with findings from previous reports by the SVRRA. Our recommendations are listed below.

Main Roads models what they are asked for in the terms of reference from the client. Therefore, this leads the SVRRA to conclude that the City of Swan provides Main Roads with narrow briefs, that all include Henley Brook Avenue. Similarly for the design work of intersections and turnoffs into the Swan Valley from Reid and Roe highways are not considering the Swan Valley Planning Act.

The full report makes clear why the SVRRA recommends:

- That the nearly 3 year old Henley Brook Avenue modelling report is made public immediately including the terms-of reference.
- Estimated cost of constructing Henley Brook Avenue is \$13.2 million, which does not include land acquisition, this money is better spend on other projects.
- The SVRRA request that the Terms-of-Reference, excluding remunerations, of the modelling requests to MRWA or other consultants are made public. They could be added as an appendix to the respective reports.
 - This procedure to be followed for future reports as this would enhance transparency both for the public and councillors.
- That the Swan Valley Planning Act is adhered to when terms-of-reference are set out, modelling is carried out or decisions are made. That there is no excuse not to do so since the SVPA was enacted first in 1995.
- City of Swan fixes errors highlighted in previous reports that it so far has ignored.
- WA Planning Commission, City of Swan and Main Roads and ground truth their data.



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1. Introduction

This document is an update of our understanding about traffic modelling in the Swan Valley combining the latest knowledge with information from previous reports.

The Swan Valley Ratepayers and Residents Association's (SVRRA) interest in traffic issues in the Swan Valley was turbocharged with the push to get Henley Brook Avenue constructed. The SVRRA, other associations and individuals put in submissions and made depositions that put pressure on the City of Swan. Resulting in that the Council adopted a motion to halt further development of Henley Brook Avenue south of Park St to have time for traffic modelling study by Main Roads WA (MRWA) to ascertain if the road was really needed. That was on 21



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March 2021, yet nearly three years later the report has not been made public. Since then, the SVRRA assessed of the City of Swan's Transport 2016 Strategy (2022), that report was distributed amongst councillors. To get up to date information about the traffic modelling that City of Swan asked MRWA to do in regards Henley Brook Avenue we had to go through the latter's Freedom of Information (FOI) proceduresⁱ. After about 8 months in June 2023, we got two maps of average quality in pdf format, which is not in the digital format we asked for. Nevertheless, we did an assessment of these maps, found errors and inconsistencies. Based on that we created a document (SVRRA, 2023a) which was provided to the City of Swan Council, who gave it to staff to have a look at. The City's staff's assessment of our report was that "... *The modelling by Main Roads is high level strategic. It focuses on the overall network. Not on technical details on small scale relating to local roads ...*". In other words, the SVRRA does not know what they are talking about. We know they missed the point that we were making, namely that there are data mistakes that influences traffic modelling, which we have highlighted again in our annual report (SVRRA, 2023b). A motion based on our current knowledge was presented to the City Swan to cease all further development on Henley Brook Avenue (SVRRA, 2024).

In the meantime, we voiced our concerns about the traffic modelling to our local member and minister for Transport the Hon. Rita Saffioti. We also got in contact with managing director at Main Roads, Mr John Erceg who is a Swan Valley resident. This resulted that we got a meeting with MRWA to discuss traffic modelling and get answers on questions raised in our documents. They provided us with a better understanding of how traffic modelling works, the processes around it, and we now realise that some of our previous assumptions were not correct. A couple weeks before that meeting, we received through the FOI request finally some digital



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modelling data which will be discussed a little later. We used this digital data to produce a document (SVRRA, 2023c) in preparation for our meeting with MRWA.

In the discussions MRWA acknowledged that when modelling they do not consider the Swan Valley Planning Act 2020 (SVPA), in part because they have not been asked to take it into account. So, it appears that the City of Swan fell short in the Terms-of-References when asking for traffic modelling or road design that the SVPA boundary is considered.

As mentioned in previous documents the smallest statistical areas (mesh blocks) that the Australian Bureau of Statistic (ABS) uses for their census data cross the boundary of the Swan Valley, as shown in figure 1. This is a problem for proper analysis since population density and other demographic indicators which are different inside the Swan Valley compared to adjacent suburbs, especially for the densely populated ones. This will affect traffic modelling since demographic data are the input for MRWA's traffic modelling. The SVRRA has contacted the ABS (August 2022) to inform them about this issue. They replied to us that they were not aware of the Swan Valley Planning Act and consequently of these straddling mesh block. In the same letter, they confirmed to modify the boundaries in 2026 to be ready for the next census. A side issue, a separate postcode for the Swan Valley would also make it easier to identify who and what is inside the SVPA boundary.



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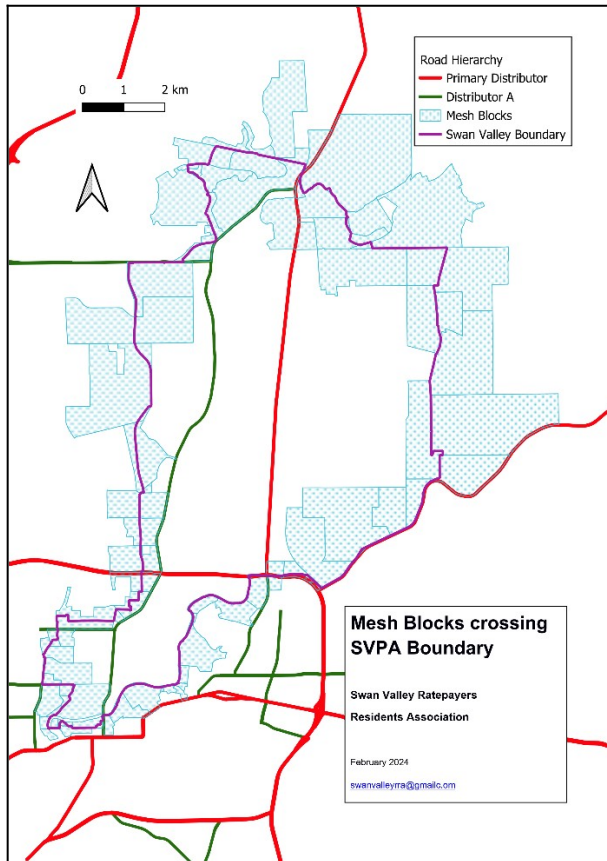


Figure 1. Census Mesh Blocks that straddle the Swan Valley boundary.

MRWA models whatever is requested (depending on Terms-of-Reference) from them by other government departments and LGAs. They do not charge for that, the only activity MRWA gets money from is licensing. When asked why Henley Brook Avenue was still in the models, the answer is that is what they were asked to do. In other words, they were not asked to model anything but with Henley Brook Avenue part of it. We conclude from this that the City of Swan had a very narrow Terms-of-References that did not ask for scenarios with and without Henley Brook Avenue. Hence the result is that Henley Brook Avenue shows up in every report as needed.



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If LGAs talk about costs of traffic modelling it is because they engage consultants as intermediates.

Any detailed modelling for specific projects needs to be done by LGAs using consultants. The ROM24 data has not enough detail for local level modelling. MRWA is only interested in modelling overall traffic flow and does not model residential and local streets. Suburban roads often are complex in their design and interconnections, as shown in figure 3, and do not impact on traffic flow of major roads. The need for Henley Brook Avenue appears not have been assessed even though Drumpellier Drive, Ellenbrook trainline and Tonkin Highway are or being constructed.

2. Modelling Methods

In previous documents by the SVRRA (2022, 2023 a, b, c) we have highlighted issues with *road hierarchy* in relation to traffic modelling. However, at the time we were not aware that MRWA uses different parameters, namely *link attributes* for their modelling and not *road hierarchy*. The reasons for this are that they have a different purpose but are complementary. Local and State governments use *road hierarchy* for planning purposes and LGAs use them also to raise funds / grants. That also explains why *road hierarchy* lines start and finish at LGA boundaries on digital maps because LGAs oversee them. Tables 1 and 2 give a description of both types of parameters. From MRWA's website road hierarchy data for the whole state can be downloaded but not maps with the *link attributes*.



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To estimate the amount of traffic allowed over a certain road data is needed like how many lanes or any traffic lights or are there any driveways coming on the road. The road modelling network is represented by straight lines between nodes. *Road hierarchy* traces the physical roads, and their planning purpose is what should be commuter or residential roads. While *link attribute* in traffic modelling represents the connection between nodes in the transport network. The input data is based on census data which is provided to MRWA by Department Planning, Lands and Heritage (DPLH) in the form of ROM24 traffic zone system based on ABS statistical areas boundaries. Since MRWA does not model local suburban roads some of the links start at the centroids of the ROM24 area (Fig 2) to capture the demographic data without having to deal with the details of suburban roads. An example map with *link attributes* is provided in figure 3, where there are 2 numbers next to each segment represent the *link attribute* for each direction. For example, a link with “5 5” means it is an *undivided arterial* road in both directions.

An example of why road hierarchy should not be used for traffic modelling is comparing St George’s Terrace in Perth with Gnangara Road from Wanneroo to Ellenbrook which both are *primary distributors*. The former 40km/h and many traffic lights while the latter is 80km/h with few traffic lights.

We obtained traffic modelling information from Main Roads from which we concluded that the only scenario employed was to have Henley Brook Avenue included. Traffic modelling systems will optimise the use of roads that are as a base in the model. Adding a new road or removing a road in the network will modify the outcomes. That is why Henley Brook Avenue shows in all results because it was included in the base map.



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MAIN ROADS WESTERN AUSTRALIA

ROM24 Network Elements

- Zones Centroids
- Model Nodes
- Modelling Links
 - Centroid connectors
 - Roads

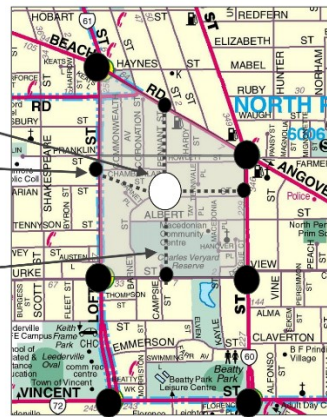


Figure-2. Road Network Elements (MRWA, 2023).



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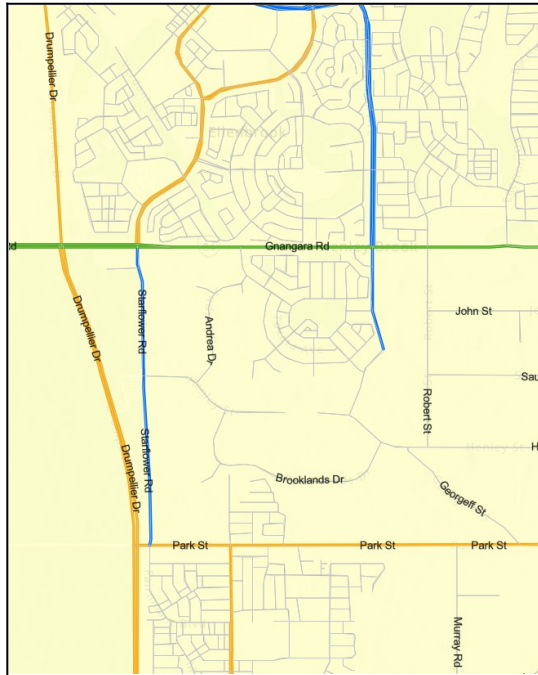


Figure 3. Example complex layout of residential roads (*access roads* in grey) in suburbs as part of overall road hierarchy. With roads of interest to MRWA in orange, green or blue. Screen shot from MRWA's website (Dec. 2023).

3. Observations

Errors in the *road hierarchy* as in figure 4, were noted in the previous reports by SVRRA (2022 and 2023 a, b, c). The 4-lane Drumpellier Drive has the same ranking as Park Street, namely a *local connector*, while 2-lane Starflower Road is marked as a *distributor B*. The ranking of Drumpellier Drive must be upgraded to a *primary distributor*. Assigning road hierarchy is a LGA responsibility, we are strongly disappointed that the City of Swan in cooperation with MRWA has not updated this since these discrepancies were mentioned a couple years ago.



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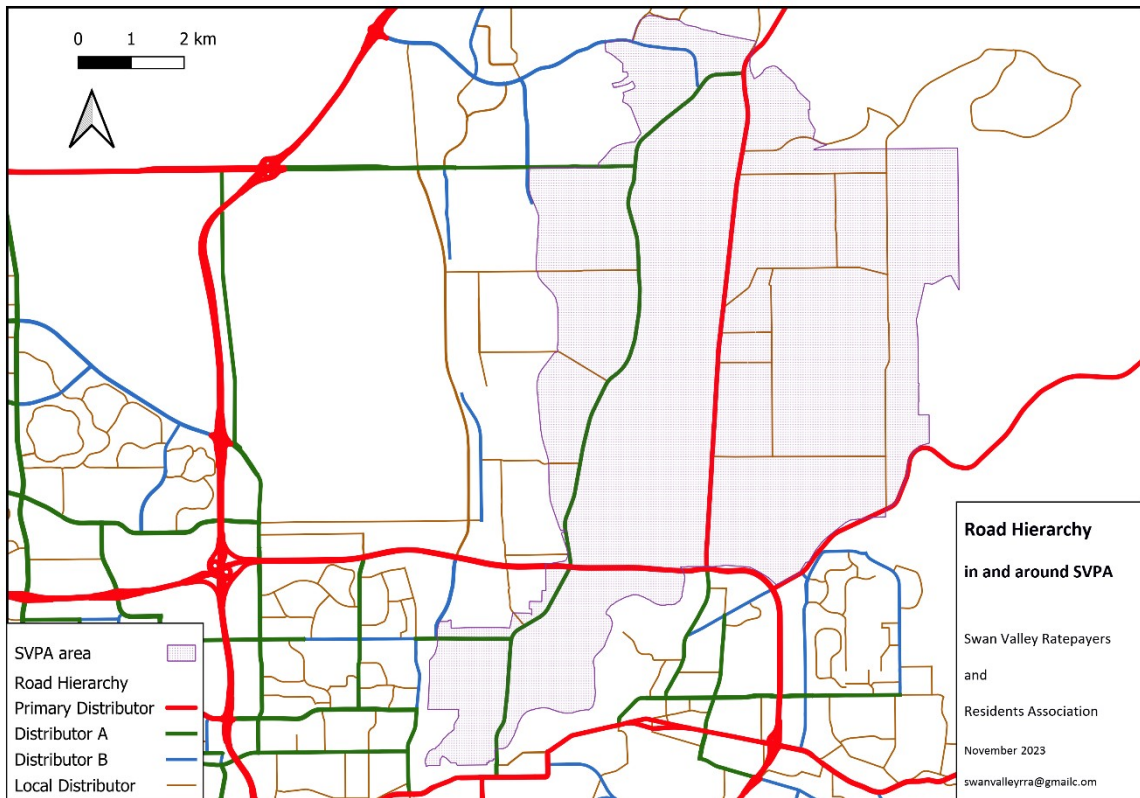


Figure 4. Road hierarchy showing some of the errors (SVRRA, 2022 & 2023). Local residential roads are omitted.

The *link attributes* of roads in and around the Swan Valley are shown in figure 5. The number of digits is on first site confusing, but the roads can be built up of many small segments, the attributes are printed for each segment. Two numbers associated with each segment as explained earlier, namely an attribute for one direction of the roads and the other for the other direction, this explains why there are so many digits along the roads.



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Through FOI, after 12 months, we obtained from MRWA digital modelling data of the Swan Valley and its surrounds, as shown in figure 5. A zoomed in part of that map, figure 6, shows that the *link attribute* of Starflower Road is not continuous to Park Street from Henley Street southwards, this will have an impact on modelling. By the way it is the same section as missing in the *road hierarchy*, as shown in figure 4.

The MRWA *attribute link* data in figure 6 shows that part of Starflower Road from Henley Street to Park Street is also missing and so no centroid link from Brooklands Estate to Starflower Road and Park Street intersection. This raises the question what influence does it have on the modelling? But more concerning that this one 'missing' link is the fact that basically all roads in the Swan Valley are recorded as category 5 = *undivided arterial* (Fig 5). Even the Great Northern Highway is classified as an *undivided arterial* = 5 road, while in our view the definition shows that it should be a *divided arterial* = 4 road. On the western edge of the Swan Valley there are links classified as *divided arterial* = 4 which coincide with the proposed Henley Brook Avenue. This makes us conclude that the traffic volume numbers generated based on these *link attributes* make Henley Brook Avenue necessary since it was classified as *divided arterial* = 4 road. These erroneous *link attribute* errors must be fixed before a new model can be run.



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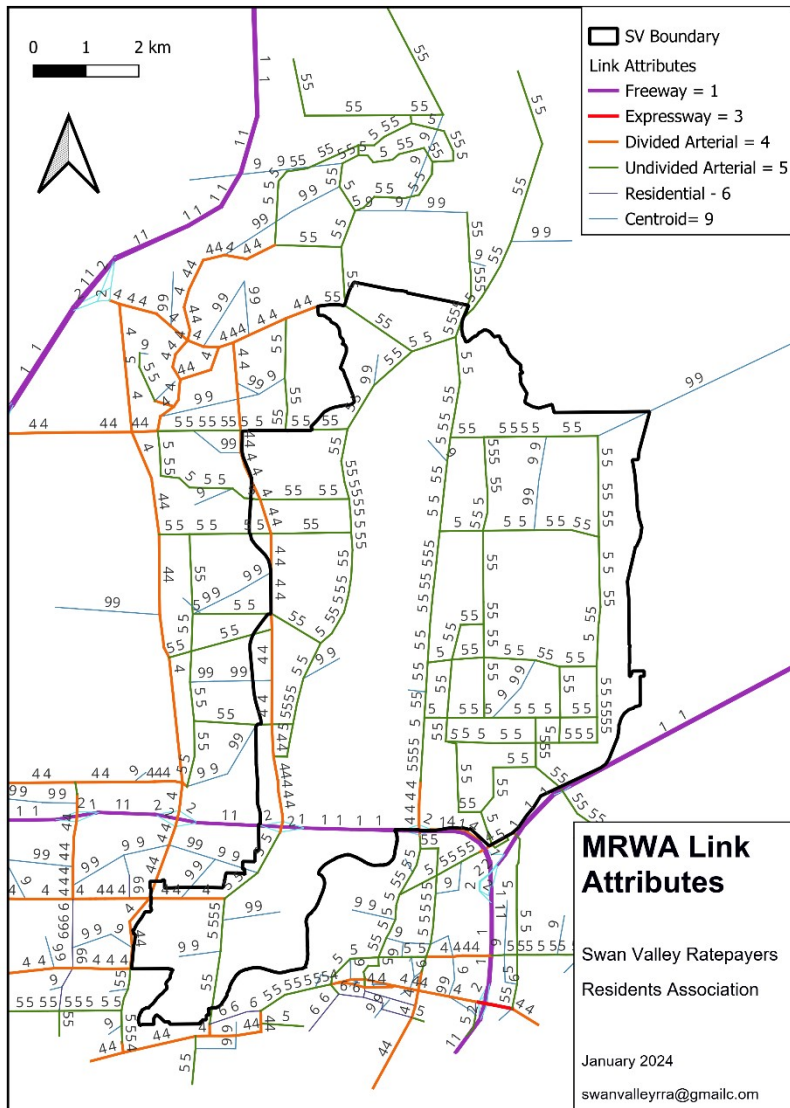


Figure 5. MWRA Link Attributes; Numbers indicate link attribute for the segment. West Swan Road and Great Northern Highway are build-up of many segments.



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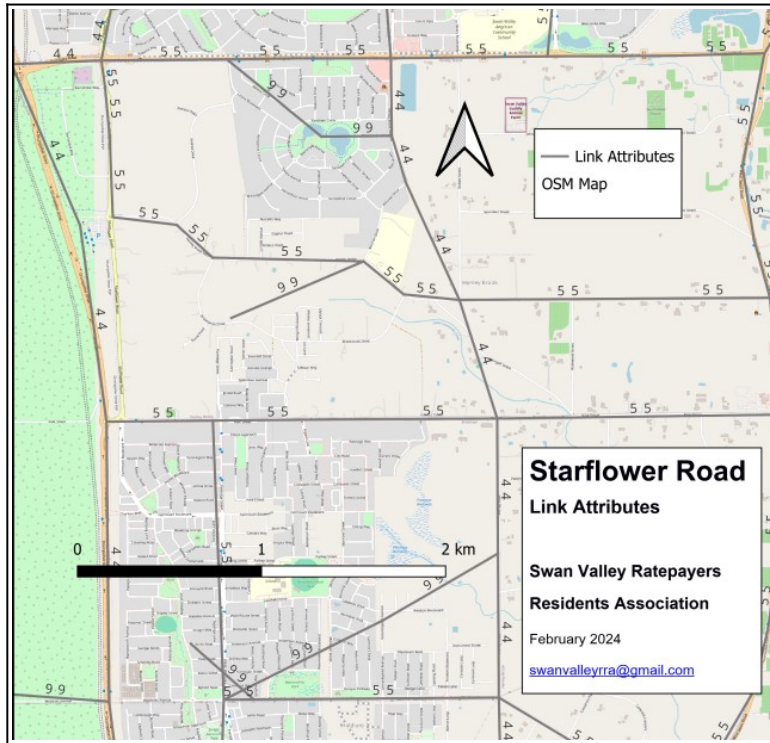


Figure 6. Starflower Road not linked to Park Street.

What this section indicates that City of Swan, Main Roads WA or WA Planning Commission do not ground-truth their data. That is, they do not go out to sites to check the data or investigate if their input data makes sense. Data validation is an essential part of gathering them before any modelling can be done. It should also be part of the ongoing maintenance of any dataset.

4. Proposals

Our observations in section 3 noted the uniformity of the *link attributes* in the Swan Valley. For that reason, we think different *link attributes* are needed that reflect the aims of the SVPA. A possible alternative scenario is shown in figure 7. To achieve



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those three new link attribute categories needed to be created, namely *SV Connector = C*, *SV Local = L* and *SV Residential = R* (details in table 3).

As it was not clear why Great Northern Highway was classified as an *undivided arterial (= 5)*, so it was reclassified as a *divided arterial (=4)* road. Drumpellier Drive is classified as a *divided arterial (= 4)*. Entries and exits are controlled by roundabouts and traffic lights which suggest it should be upgraded to an *expressway (= 3)*. Parts of Benara Road are not divided and so should be downgraded to an *undivided arterial (= 5)*.

West Swan Road is marked as *undivided arterial (= 5)* and a *distributor B* in the road hierarchy. West Swan Road has become too much a commuter road therefore most of it should be downgraded to an *SV connector = C*. This idea will not sit well with WAPC, MRWA or City of Swan, but as pointed out in previous reports that since the SVPA was first enacted in 1995 they had enough time to design alternatives with the aim to divert traffic from West Swan Road and to downgrade it to a *local connector*.

The Arthur Street bridge is not part of the traffic modelling because it is a residential road. But the road will have an impact on the traffic on West Swan Road. We have not seen data supporting the construction of that bridge. However, looking at the overall picture of traffic in the Swan Valley it appears that it is another case that the City of Swan and state government departments that approved the bridge did not consider the SVPA.



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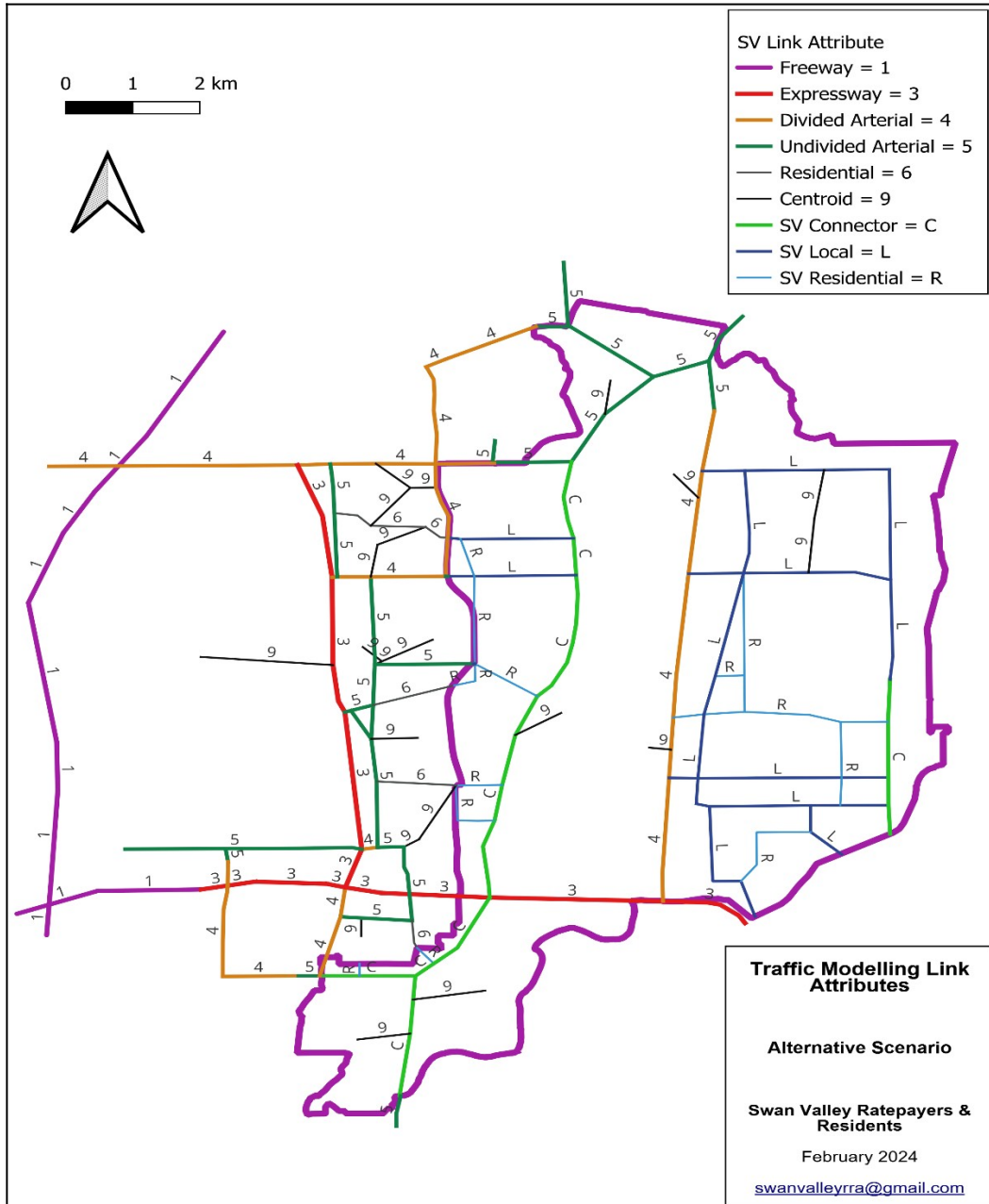


Figure 7. A scenario of alternative link attributes for Swan Valley that mirror the aims of the SVPA.



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To reduce any further traffic through the Swan Valley to and from Bullsbrook, where population will grow from 7,000 to 85,000 by 2050, the Ellenbrook railway line needs to be extended to cope with future traffic.

5. Intersection Designs

The design of roads and intersection like Eastlink are based on predictions and requests by DPLH and others. Their initial design is purely technical based on how roads fit best in the existing network, for example the Gugerri-Wilson turnoff (Figure 8 and 9). Which was triggered by the modification of intersection of Eastlink with Talbot Street, so MRWA came up with that road and intersection design. Interesting to note about this road design is that Toodyay Road is a *Primary Distributor* in the road hierarchy while other roads affected are classified as *Access Roads*, a residential road category. Again, this large road design is inside the Swan Valley boundary because MRWA were not asked to take the Swan Valley boundary as a constraint.

The intersection design at Stefanelli and Swan Christian is just an intersection design. There are no plans on the drawing board to connect Stefanelli with Gugerri-Wilson.



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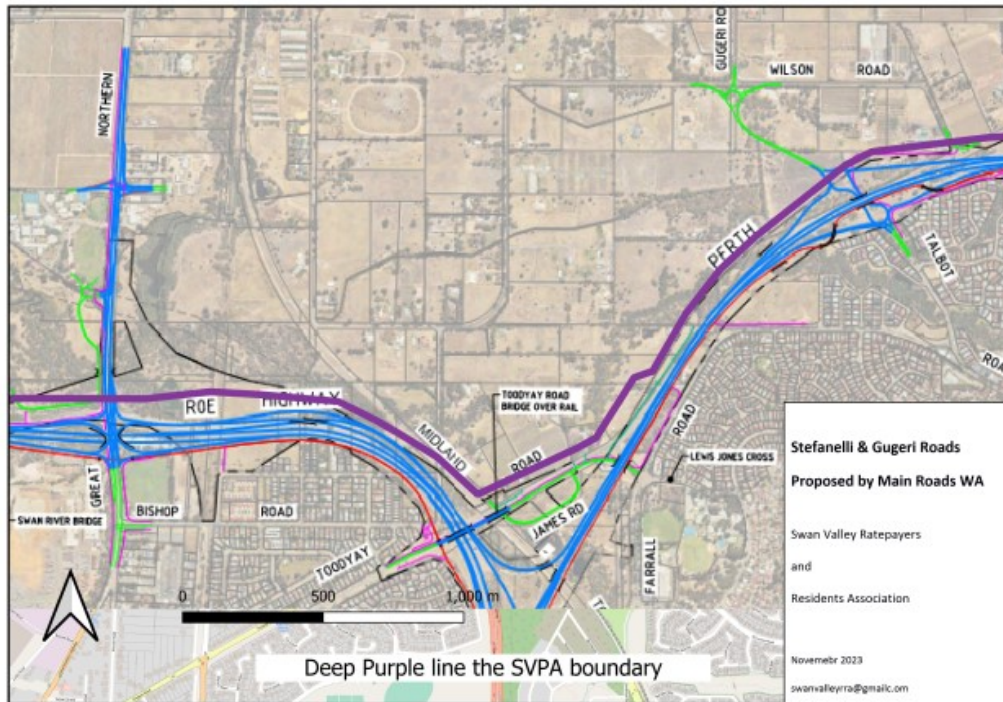


Figure 8. Eastlink turnoff Talbot - Gugerri-Wilson (MRWA Eastlink website).



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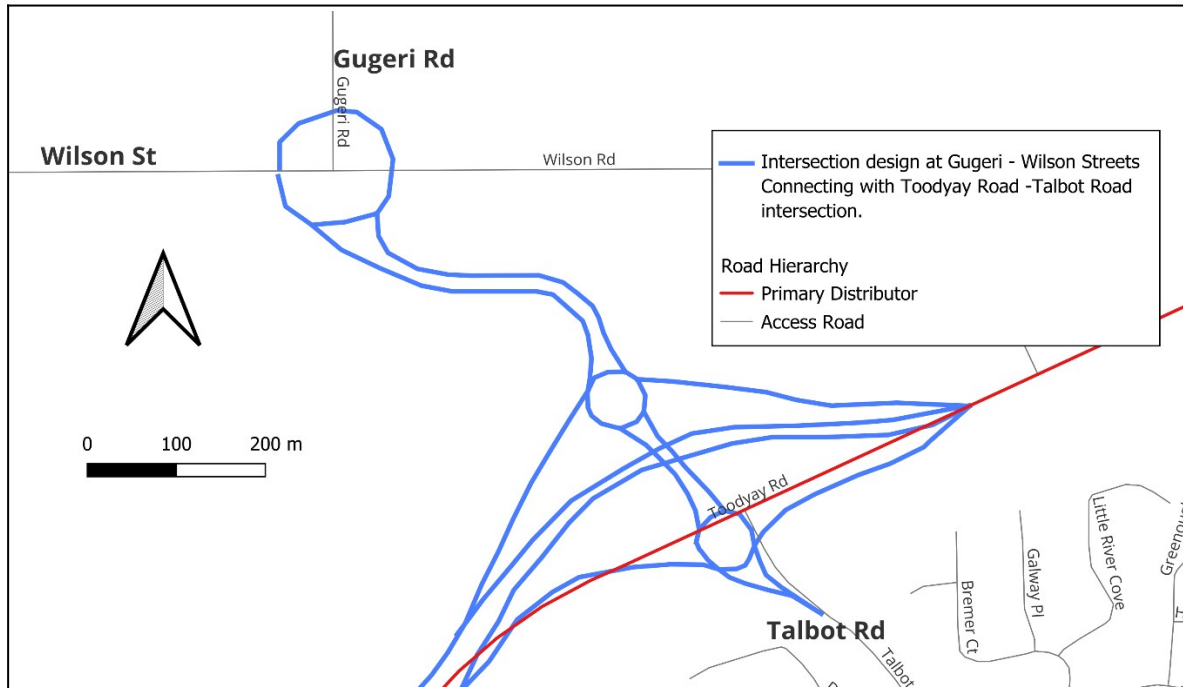


Figure 9. Design roads from Talbot Rd to the Gugeri Road Wilson Street intersection as was found on OpenStreetMap.

We understand that there is no funding for the Great Northern Highway – Reid Highway – Roe Highway intersection and Eastlink. There is money for the West Swan Road – Reid Highway intersection. A couple of designs of the West Swan Road – Reid Highway intersection will soon be published. With or without Henley Brook Avenue it is a very complicated design (see sketch of figure 9). Tourists travel along West Swan Road will not intersect with Reid Highway but is redirected via Harris Road underpass, near Mandoon Estate. This is a simplified version. As I understand it whatever happens to Henley Brook Avenue the rest of the design stays more or less the same. The loops are so large because they must cater for big trucks which is only needed if Henley Brook Avenue is constructed.

OpenStreetMap (2023) shows dotted outlines of potential road and intersection



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design of the West Swan Road – Reid Highway intersection, which is different from the sketch we remembered, but that design is likely more as the real design and shown in figure 10. The solid blue lines are as found on OpenStreetMap, while the dotted blue lines are our guesstimated connecting roads. In the design of the large intersection was the SVPA considered?

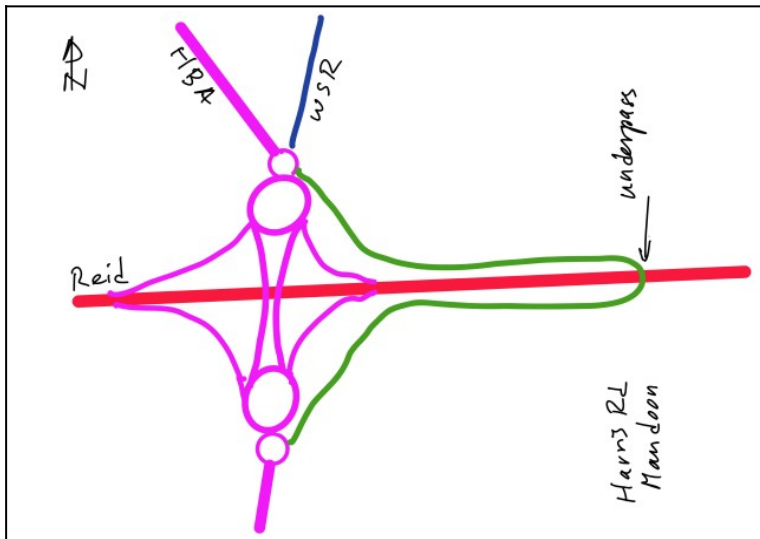


Figure 9. This sketch is just a simplification proposed design WSR-Reid intersection as remembered from the meeting with MRWA. Not to scale.



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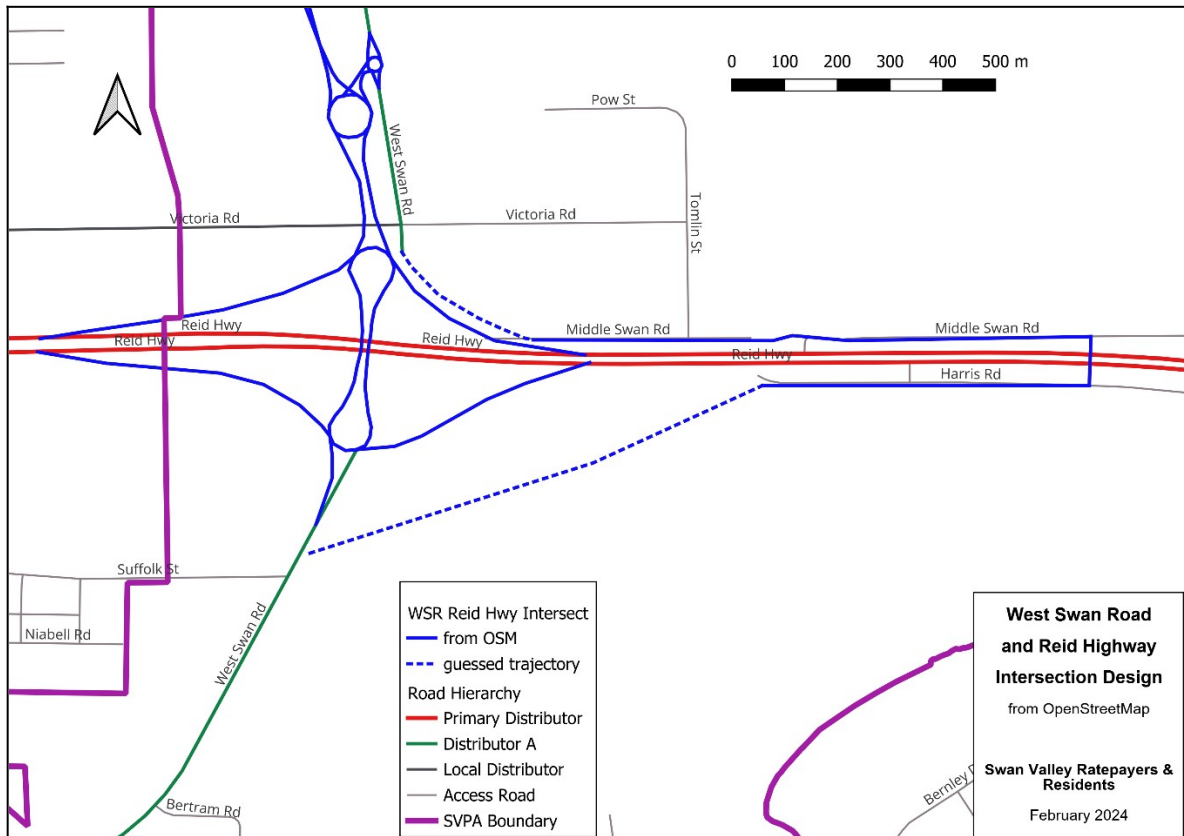


Figure 10. This is the design WSR-Reid intersection as was found on OpenStreetMap.

Since the Henley Brook Avenue is a relic of past thinking and should not be build, the bridge at this intersection can be simpler and a more interesting design as proposed by Jan Zeck (Figure 11). This steel design may even be more sustainable over its lifetime.



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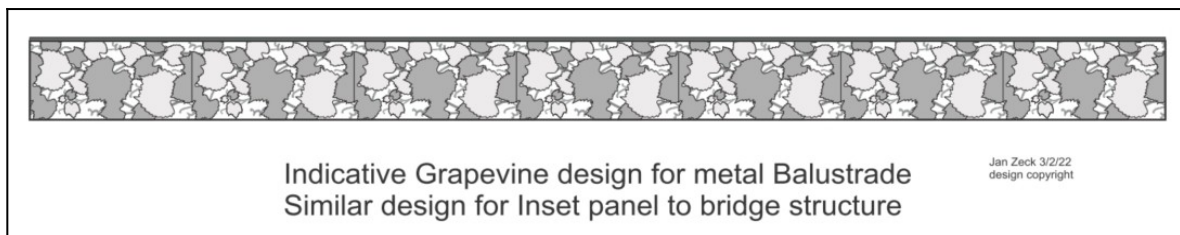
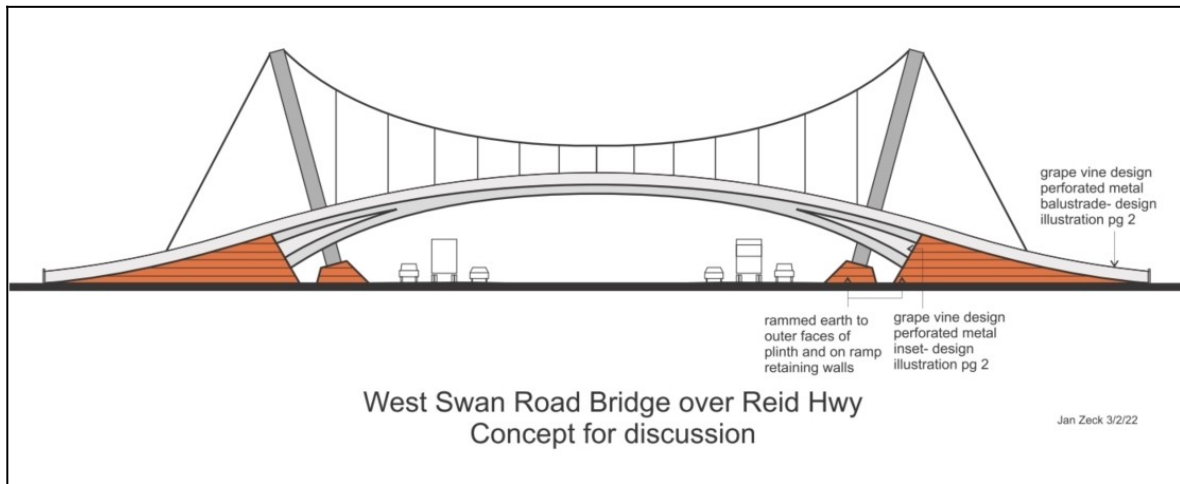


Figure 11. A concept design of a bridge at the West Swan Road and Reid Highway intersection.

There is a need to redesign the Henley Brook Avenue intersection with Park Street because that road should not be constructed south of Park Street. There is no evidence that the southern part is needed in addition to the detrimental impact on Pannage Wetlands and the Bush Forever Site 200. A possible option for the new intersection design is shown in figure 12. Traffic going south on Henley Brook Avenue can turn left in to Park St towards West Swan Road. Coming from West Swan Road along park Street going to Drumpellier Drive take a slight left turn onto Park Street West. From Park Street East onto Henley Brook Avenue continue west till U-turn option and then go north. From Park St West into Park St East turn into



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Henley Brook Avenue and then use the U-turn option to go south to the left turn to go east.

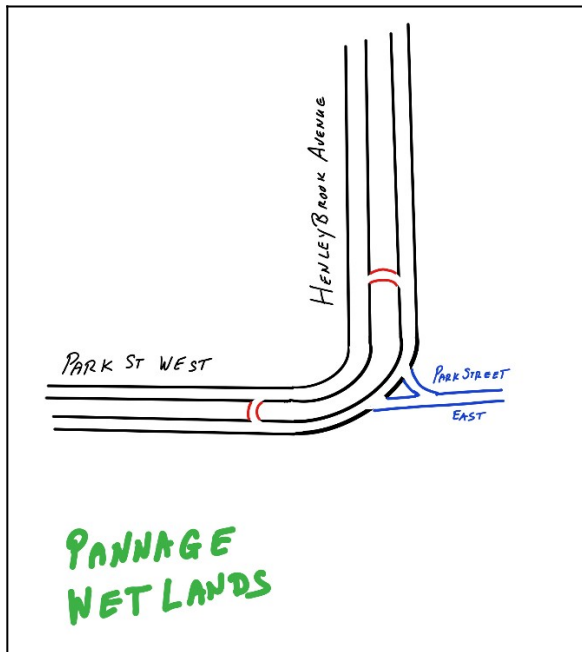


Figure 12. A sketched redesign option for the Henley Brook Avenue and Park Street intersection. Traffic going south on Henley Brook Ave can turn left in to Park St. From Park St East going west a slight left turn. From Park Street East onto Henley Brook Ave continue west till U-turn option and then go north. From Park St West into Park St East turn into Henley Brook Ave and then use the U-turn option to go south to the left turn to go east.

6. Environment

As mentioned above the construction of Henley Brook Avenue will affect a “**Bush Forever site 200**” near Caversham Airfield and the “**Pannage Wetlands**” just south of Park Street. Which both already are impacted by the adjacent densely buildup suburbs, by amongst others “light pollution”. The trajectory of this road goes through both sites would fragment the integrity of the bushland that should be retained for local flora and fauna protection (Figure13). The sites are an important



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ecological site, both for flora and fauna diversity, and for the wild-life corridor between Whiteman Park and the Swan River valley.

The rationale for the preservation of sites like these is well understood and preservation of such sites should be paramount in all development considerations.

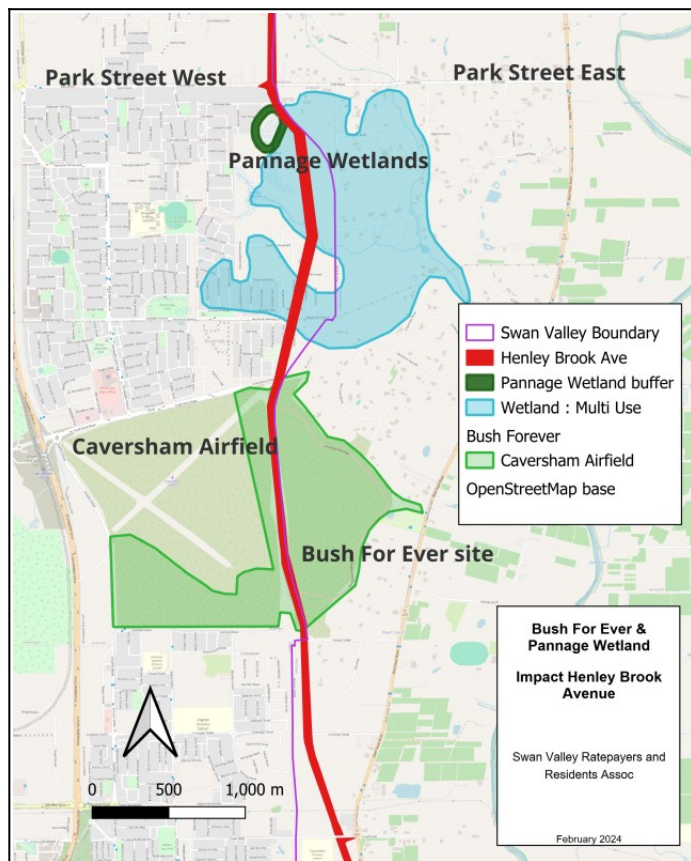


Figure 13. Location of Henley Brook Avenue in relation to Bush Forever 200 site and Pannage Wetlands



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7. Costings

The City of Swan will have the financial burden for the construction and maintenance of Henley Brook Avenue, a road that is totally unnecessary and superfluous to traffic requirements. We estimate that the construction will cost \$13.2 million, this figure is based on the budgeted section of Henley Brook Avenue between Gngalara Road and Park Street, a stretch of 2 km costed \$4.4 million. The part south of Park Street to the Reid Highway – West Swan Road intersection is 6km resulting in \$13.2 million. This figure does not include any land acquisition, future maintenance and increased costs of construction. This money should instead be spent on other projects.

Has lifetime financial modelling and a cost benefit analysis been completed for this proposed road development? For that process it is recommended to use Life Cycle Assessment (LCA) tools, which include life span of material, recyclability, environmental footprint of transport of materials and processes used. Local governments do not only govern for today but also for the future, and therefore knowing the costs of a project over its lifetime is good financial management. Even if the upfront cost may be a little higher. Has the city carried out this type of financial evaluations and are the results in the public domain? If so the SVRRA requests that it also be made available for independent financial analysis and that report be made public.

It is the City of Swan's fiduciary duty to carry out the best financial practices.



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8. Governance

As alerted to in this report there appears to be a lack of transparency. This may result in that decisions are made that are not in the interest of the community.

We understand that when a given a task to be solved a problem one gets engrossed in it that wider reality is lost in view. Therefore, having these projects “peer reviewed” or in (local) government case “community reviewed” will improve the projects. It can be said that it already happens by allowing the public to make submissions. However, all submission comments and suggestions can be ignored after they have been ticked off, because never are reasons given why a suggestion is declined.

Public submissions should not be seen as an attack on local government staff, but as comments at no cost by a consultant, in this case the public. Implementing documentation on public comments will cost money but will also provide a better base for decision making. But what will the current and future costs be of bad decisions, based on for example incomplete traffic modelling or strategic planning. That is why we asking to make Terms-of Reference and reports of technical nature like traffic modelling or strategic planning, public as soon as they are received.

Making the traffic modelling report not public for three years, concerns the SVRRA that this has occurred when the City of Swan prides itself on transparency and accountability something it highlighted in its annual report presentation (CoSw, 2024).



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9. Conclusions

From all the investigations carried out we conclude:

- City of Swan needs to release traffic modelling report. In March 2024 it will be 3 years since the Council accepted the motion to put development of Henley Brook Avenue south of Park St on hold till new modelling was carried out. That report is still at large. What is the City of Swan hiding?
- City of Swan traffic modelling requests have been too narrow, Henley Brook Avenue had to be included in every model. No scenarios **without** Henley Brook Avenue and therefore current modelling outcomes biased.
- The money saved by not developing Henley Brook Avenue is a minimum of \$13.2 million in construction costs which does not include land acquisition and maintenance can be spent elsewhere.
- City of Swan needs to fix errors in the road hierarchy.
- MRWA needs to modify their link attributes to fix mistakes and update roads to reflect current reality of the Swan Valley.
- All levels of Government should ground truth their input data, i.e. checking all data entries if they are valid.
- The SVPA needs to be constraint number 1 for any government planning regarding the Swan Valley.
- Request that the Terms-of-Reference, excluding financials, of the modelling request to MRWA or other consultants are made public. They could be added as an appendix to the report. This procedure also for future reports. This would enhance transparency both for the public and councillors.
- That in general Terms-of-References should be made public, that is include them in the final report, so that the public can scrutinise what has been



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carried out. Governments will not like this idea because it would increase transparency.

- SVRRA should be part of vetting the terms of reference for future modelling.



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Tables

Primary Distributor	Provide for major regional and inter-regional traffic movement and carry large volumes of generally fast moving traffic. Some are strategic freight routes and all are State Roads. They are managed by Main Roads Western Australia.
Regional Distributor	Roads that are not Primary Distributors, but which link significant destinations and are designed for efficient movement of people and goods within and beyond regional areas. They are managed by local government.
Distributor A	Carry traffic between industrial, commercial and residential areas and generally connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining property
Distributor B	Perform a similar function to type A District Distributors, but with reduced capacity due to flow restrictions caused by frequent property accesses and roadside parking in many instances. These are often older roads with a traffic demand in excess of that originally intended.
Local Distributor	<p><u>Built Up Area</u> Roads that carry traffic within a cell and link District Distributors or Primary Distributors at the boundary, to access roads. The route of Local Distributors should discourage through traffic so that the cell formed by the grid of higher order distributor roads, only carries traffic belonging to, or serving the area. Local Distributors should accommodate buses, but discourage trucks.</p>
	<p><u>Rural</u> Connect to other Rural Distributors and to Rural Access Roads. They are not Regional Distributors, but are designed for the efficient movement of people and goods within regional areas.</p>
Access Road	Provide access to abutting properties with safety aspects having priority over the vehicle movement function. In urban areas, these roads are bicycle and pedestrian friendly, with aesthetics and amenity also important. Access Roads are managed by local government.

Link	Type	Description
1	Freeways	Limited access to the freeway at on-ramps and exit at on-ramps
2	Ramps	
3	Expressways	Access to the expressway at larger intersections controlled by traffic lights
4	Divided Arterials	two separated carriageways, with access and exit via uncontrolled and controlled intersections
5	Undivided Arterials	Carriageways where lanes in opposite direction are not separated by a median strip.
6	Residential	Local residential roads



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7	Managed Freeways	So-called "Smart-freeways"
9	Centroids	The centre of the census statistical areas used as input points for traffic modelling into connecting roads.

Table 3. Swan Valley categories

C	SV Connector	A combination of 5 = <i>undivided arterial</i> and <i>Local Distributor</i> in the Road Hierarchy.
L	SV Local	Like 6 = <i>Residential</i> but also a <i>Local Distributor</i>
R	SV Residential	Like 6 = <i>Residential</i> and the <i>Access Road</i> in the Road Hierarchy but in a rural setting



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References¹

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¹ The SVRRA documents are available on request.

FOI is not an easy process because you ask only for specific documents, cannot have any questions or make comments. There is also a barrage of communications to get what is asked for or to point out that was provided was not very useful. An extreme example of Freedom of Information response is the following article from the Post Newspaper (<https://postnewspapers.com.au/>).

POST, January 20, 2024 – Page 11

PTA blacks out railway damage

By EMMA BLADEN

The Public Transport Authority has refused to reveal how much damage to Swanbourne homes was caused by the airport railway line works.

It responded to the POST's request for information by providing three documents – but all are completely redacted.

The seven pages are blacked out without a single word being revealed.

The POST lodged a request for PTA documents on November 21 under the state's Freedom of Information law.

The PTA responded more than six weeks later by sending copies of three blacked-out documents which it said were spreadsheets of active claims, settled claims, and information collected from home surveys.

PTA corporate issues manager Philip Rakich wrote that network and infrastructure manager Elwyn Gearon had said three documents fell within the scope of the POST's request.

But access was denied because the documents contained "personal information".

The number and extent of homes damaged by airport rail line works could not be ascertained and there were no details of the volume or detail of settled claims.

One Claremont Crescent homeowner frustrated with the progress of her claim for damages was advised by a lawyer on ABC Radio that she and her neighbours should launch a class action against the PTA.

Another homeowner told the POST the airport rail line works had caused more than \$100,000 damage to his home, (*Bad vibes shake out class action*, POST, November 13). He had received no indication of when he might be compensated.

The PTA redacted every word in reports the POST received under FOI.

