Boondah Precinct Masterplan
Southern Buffer
Warriewood
Transport Assessment

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GTAconsultants

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Southern Buffer, Warriewood

Transport Assessment

Issue: A 05/07/13

Client: Henroth Investments Pty Ltd c/- Warriewood Southern Buffer Private Landowners Henry Fraser Pty Ltd, Cassius Investments, Henlen Pty Ltd, Kamfam Pty Ltd, Trbojevic and Rooke

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1. Introduction

This report has been prepared on behalf of the private land owners within the Warriewood Southern Buffer, to present the findings of a preliminary assessment of the transport implications of a Masterplan for development within the Warriewood Southern Buffer.

The Masterplan has been prepared by GM Urban Design & Architecture, and comprises a mixed use development with retail and commercial areas, residential apartments and a modified road network.

Previous planning work in the Warriewood Valley area has determined appropriate land uses for the area and measures required to accommodate future traffic demands. This assessment compares the likely impacts of the Masterplan with those addressed in the previous work.

The remainder of the report is set out as follows:

- Section 2 describes the background situation in the Warriewood Valley area, including the location of the proposed development, the planning background in the area, and the existing road network and public transport services.
- Section 3 describes the proposed Masterplan and estimates its peak hourly traffic generation potential.
- Section 4 reviews the implications of the Masterplan in comparison with previous planning work in the area, including traffic generation, roadway capacity and public transport implications. The Masterplan's parking provisions are also reviewed.
- Section 5 presents a summary of the findings of this study.

2. Existing Situation

2.1 Site Location

The proposed Masterplan site lies within the area identified as the Southern Buffer in the *Warriewood Valley Planning Framework* (Pittwater Council, 2010), generally along Boondah Road.

2.2 Planning Background

The *Warriewood Planning Framework* (Pittwater Council, 2010) identifies land within the Warriewood Valley which can suitably be developed, what general forms of development should occur, and densities of that development.

The *Warriewood Valley Roads Master Plan* (2006 Review) sets out road classifications, cross sections and management measures for the road system in the Warriewood Valley Urban Land Release Area. The traffic management measures are being completed over time, with the following measures of relevance to the Masterplan site not yet completed:

- Roundabout at Boondah Road and Jacksons Road
- Roundabout at Boondah Road and Macpherson Street
- Roundabout at Vuko Place and Warriewood Road
- Amended roundabout at Macpherson Street and Warriewood Road
- Upgrade of Pittwater Road and Warriewood Road intersection
- Upgrade of Pittwater Road and Jacksons Road intersection
- Upgrade of Boondah Road to typical subarterial road cross-section, including calming measures and bridge work.

2.3 Warriewood Valley Strategic Transport Study

The *Warriewood Valley Strategic Transport Study* (AECOM, 2011) assessed the feasibility of development opportunities in the undeveloped land parcels in the Warriewood Valley Release Area. This included assessment of four scenarios, including two options for development within the Southern Buffer, as follows:

Southern Buffer Option 1 (Scenario 3):

- 18,000m^2 GFA (13,500m^2 GLFA) retail
- 2,000m^2 commercial; and
- 80 residential dwellings.

Southern Buffer Option 2 (Scenario 4):

- 25,000m^2 GFA (18,750m^2 GLFA) retail
- 22,500m^2 GLFA bulky goods
- 5,000m^2 GFA commercial; and
- 160 residential dwellings.

Forecasts of increases in traffic were estimated using NSW Roads and Traffic Authority trip rates, Journey to Work patterns as well as primary and secondary retail catchment information for the residential and commercial land uses.

The traffic generation assessed for the two options is summarised in Table 2.1.

Table 2.1: Warriewood Strategic Transport Review Southern Buffer Trip Generation (vehicles/hour)

Component	Option 1 (Scenario 3)		Option 2 (Scenario 4)	
	AM Peak	PM Peak	AM Peak	PM Peak
Residential	40	40	80	80
Commercial	40	40	100	100
Retail	270	608	375	844
Bulky goods	-	-	563	563
Total	**350**	**688**	**1,118**	**1,587**

Source: AECOM, 2011

The assessment found that under both these scenarios, all of the analysed intersections would perform adequately at Level of Service C or better, with the exception of the intersection of Jacksons Road and Pittwater Road. This intersection would require significant mitigation measures to provide additional capacity. For Scenario 3, the right turn bay in Pittwater Road North would need to be lengthened. For Scenario 4, a second right turn lane would be needed in Pittwater Road North, together with an additional westbound lane in Jacksons Road, an unsignalised left turn slip lane from Jacksons Road to Pittwater Road, and remarking of the eastbound lanes in Jacksons Road to create two right turn lanes.

In addition, mitigation measures would be required at the intersection of Garden Street and Powder Works Road to provide additional capacity for the Scenario 2, which did not include the increased traffic generation from the Southern Buffer area. The suggested measures include remarking of the existing road space and removal of kerbside parking. No additional measures would be required at this intersection for Scenarios 3 and 4.

2.4 Existing Road Network

The primary roads relevant to access for the subject site and Masterplan are briefly described below.

Boondah Road is identified as a subarterial street in Council's Roads Master Plan, and has a single travel lane in each direction, and a speed limit of 50kph along its northern part, and 40kph along its southern part. It provides a link between Macpherson Street in the north and Jacksons Road in the south. It intersects with Jacksons Road to the east of Warriewood Centre. The intersection is priority controlled, and is earmarked for upgrading to roundabout control in the Warriewood Valley Roads Master Plan.

Jacksons Road extends east-west between Pittwater Road and Garden Street. Jacksons Road provides vehicular access to the Warriewood Centre, and Narrabeen Sports High School. The easternmost access for Warriewood Centre is controlled by a roundabout, and the central and eastern accesses are priority intersections. Jacksons Road has two travel lanes in each direction at its western end, and two eastbound lanes at its eastern end, at the approach to Pittwater Road. The remainder of Jacksons Road has a single travel lane for each direction, with pedestrian crossing facilities. The classification of Jacksons Road is not specified in the Warriewood Valley Roads Master Plan, however the traffic volume reported in that document is consistent with the upper limit for a sub-arterial road.

Ponderosa Parade – Macpherson Street – Warriewood Road (east) form a route through Warriewood Valley between Mona Vale Road to the north and Pittwater Road to the south-east. Along most of its length, the route typically has a single travel lane in each direction, and major intersections within the Valley are controlled with roundabouts (or are planned to be), while the access intersections with Mona Vale Road and Pittwater Road are signal controlled. This route is classified as a subarterial route in the Warriewood Valley Roads Master Plan.

Garden Street extends from Pittwater Road to Macpherson Street, and is classified as a sub-arterial road in the Warriewood Valley Roads Master Plan. It typically has a single travel lane in each direction, and its major intersections are roundabout controlled.

Vuko Place is a cul de sac which extends southwards from Warriewood Road, between Macpherson Street and Pittwater Road. It provides local access to a number of developments, including a cinema, Council support offices, and various industrial/commercial units. Vuko Place has a single travel lane in each direction, with kerbside parking.

2.5 Public Transport

The primary type of public transport available in the vicinity of the Southern Buffer is buses, which are operated by Sydney Buses. Routes 185 and L85 operate between Mona Vale and the City, and buses travel in both directions along Pittwater Road – Jacksons Road – Garden Street – Macpherson Street – Warriewood Road – Foley Street – Mona Vale Road. Route 182 operates between Mona Vale and Elanora Heights, and the buses travel in both directions along Powder Works Road – Garden Street – Pittwater Road – Jacksons Road – Garden Street – Macpherson Street – Ponderosa Parade – Mona Vale Road.

No buses currently operate along Boondah Road or Warriewood Road between Pittwater Road and Macpherson Street.

Sydney Buses review service levels on an on-going basis, and increases to services may result from increased demand generated by developments under construction or completed in the area.

3. The Masterplan

3.1 Proposed Development

The Masterplan proposes a mixed use development with retail and commercial areas, residential apartments and a modified road network. The site is divided into six sub-sites, and the proposed mix of uses is summarised in Table 3.1. The number of car parking spaces presented in this table is an indication of the space allocated to car parking within each sub-site, with an allowance of 35m^2 GFA per parking space, and does not necessarily reflect the actual number of spaces which would result.

Table 3.1: Masterplan Components

	Residential (units)[A]	Commercial (GFA)	Retail (GFA)	Community (GFA)	Estimated Parking Spaces
Site A	39	-	-	-	93
Site B	115	-	10,708	-	714
Site C	35	-	2,322	-	181
Site D	146	2,916	9,004	1,537	812
Site E	-	4,821	-	-	110
Site F	20	-	1,393	-	143
Total	**355**	**7,737**	**23,427**	**1,537**	**2,053**

[A] Assumes average 100m^2 GFA per unit

Details of the intended use of the proposed Community facilities are not yet known, and may comprise (for example) new facilities to add to the nearby Nelson Heather Centre, additional amenities for the sports fields, or a library. The retail area is proposed to comprise a mix of spaces, with two "big box" spaces which may be occupied by a supermarket or discount department store.

3.2 Modified Road Network

The Masterplan proposes modifications to the existing road network as follows:

- Construction of a new road on a north-south alignment parallel to and approximately 150m to the west of Boondah Road;
- Closure of the southern portion of Boondah Road, over a distance of approximately 200m north of Jacksons Road;
- Construction of a new road on an east-west alignment linking the southern end of Boondah Road with the new north-south road; and
- Construction of a new road linking Boondah Road (from near the bend approximately 350m north of Jacksons Road) with the southern end of Vuko Place.

The modifications to the road network would therefore create a new "loop" around Site D with the Masterplan site, and a new link between Boondah Road and Vuko Place.

It is understood that the design of the modified road network would take into consideration the flooding levels in the area, with road levels designed to maintain access during floods. While detailed designs have not yet been undertaken, current indications are that the grades of the road to achieve the required levels would be in the order of 1:100.

For consistency with the surrounding road network, the modified road network would generally be constructed to the cross-section standards set out in the Warriewood Valley Roads Master Plan.

3.3 Masterplan Traffic Generation

The traffic generation of the Masterplan development has been estimated using the same RMS trip rates used in the Warriewood Valley Strategic Transport Review where relevant. The traffic generation of the possible uses of the community facilities may vary significantly, with peaks occurring at different times of the day or week. For the purpose of this preliminary assessment, the community facilities have been assessed assuming that they generate vehicle trips at a similar rate to the retail space. This is considered to result in a conservatively high estimate of the commuter peak traffic generation.

The results are summarised in Table 3.2.

Table 3.2: Masterplan Peak Hour Traffic Generation (vehicles per hour)

	AM Rate	PM Rate	AM Trips	PM Trips
355 Residential (units)	0.5 trips per dwelling	0.5 trips per dwelling	178	178
7,737m^2 GFA Commercial	2 trips per 100m^2 GFA	2 trips per 100m^2 GFA	155	155
17,570m^2 GLFA Retail	2 trips/100m^2 GLFA	4.5 trips/100m^2 GFA	351	791
1,153m^2 GLFA Community	2 trips/100m^2 GLFA	4.5 trips/100m^2 GFA	23	52
Total Hourly Trips			**707**	**1,176**

4. Transport Implications of Masterplan

4.1 Traffic Generation and Distribution

Comparing the estimated traffic generation of the Masterplan (Table 3.2) with that used in the Warriewood Valley Strategic Transport Review (Table 2.1), it is evident that the Masterplan would generate somewhat more vehicle trips than Option 1 assessed by AECOM, but fewer vehicle trips than assessed for Option 2. This comparison is presented in Table 4.1.

Table 4.1: Traffic Generation Comparison (vehicles per hour)

	AM Peak	PM Peak
Option 1 – Scenario 3	350	688
Option 2 – Scenario 4	1,118	1,587
Masterplan	707	1,176

Although the total traffic generation of the Masterplan is expected to be less than that assessed for Option 2 (Scenario 4) by AECOM, a key difference between the two scenarios is the types of trips being generated, which is expected to impact on the distribution of the traffic on the road network. This is because the arrival and departure pattern of residential traffic is different from that of retail traffic, which is different again to that of commercial traffic. The contribution of the various land uses to the total development is significantly different between the Masterplan and the options assessed by AECOM. In order to compare the Masterplan traffic impacts with the scenarios already assessed by AECOM, the Masterplan traffic has been distributed on the road system using the same assumptions applied by AECOM. The resulting distribution of Southern Buffer traffic by direction is presented in Table 4.2.

Table 4.2: Distribution of Masterplan and Options 1 and 2 Peak Hour Traffic (vehicles per hour)

	South via Pittwater Rd	North/Northeast via Pittwater/Barrenjoey Rds	West via Mona Vale Rd	West via Powderworks Rd	Internal
AM Peak Hour Masterplan					
Inbound	170	176	35	14	43
Outbound	139	57	37	4	33
Two Way	309	233	71	18	76
AM Peak Hour Option 1					
Inbound	91	113	9	10	20
Outbound	57	30	8	3	10
Two Way	148	143	17	13	30
AM Peak Hour Option 2					
Inbound	296	384	22	35	64
Outbound	170	97	17	9	25
Two Way	466	482	39	45	89
PM Peak Hour Masterplan					
Inbound	259	296	39	25	62
Outbound	264	145	33	13	42
Two Way	523	441	72	39	104
PM Peak Hour Option 1					
Inbound	149	197	9	18	32
Outbound	154	95	8	10	19
Two Way	302	292	17	28	50
PM Peak Hour Option 2					
Inbound	340	454	18	42	71
Outbound	358	221	21	23	44
Two Way	698	675	39	65	115

Table 4.2 demonstrates that:

- the Masterplan traffic travelling in all directions, including internal to Warriewood Valley, would be higher than that assessed by AECOM for Option 1;
- the Masterplan traffic travelling to and from the South, North, Northeast and West via Powderworks Road would be lower than that assessed by AECOM for Option 2; and
- the Masterplan traffic travelling to and from the West via Mona Vale Road would be higher than that assessed for Option 2 during both the AM and PM peak hours. The increase is small, being 13 inbound and 20 outbound vehicles per hour.

It is noted that the proposed modifications to the road network described in Section 3.2 may result in some changes to the routes chosen by drivers travelling between the Southern Buffer and the arterial roads compared with those assessed in the AECOM report. Considering the proposed road network, the main differences are likely to be an increase in traffic to/from Pittwater Road North using Warriewood Road – Vuko Place – New Road and a decrease in traffic to/from Pittwater Road North using Jacksons Road – New North-South Road. This may further reduce the need for mitigation works at the intersection of Pittwater Road and Jacksons Road, with possibly additional measures required at the Pittwater Road/Warriewood Road intersection. Any upgrading of the Pittwater Road intersections would be subject to consultation with RMS, which would be undertaken as the development design proceeds.

4.2 Intersection Capacity Impacts

As the Masterplan traffic generation would be higher than that of Option 1 (Scenario 3), it follows that the mitigation measures required to provide adequate roadway capacity for Scenario 3 would also be needed for the Masterplan.

The primary location requiring additional capacity for Option 2 is the intersection of Pittwater Road and Jacksons Road. To further examine the implications of the difference between the Masterplan and the AECOM options, Table 4.3 summarises the estimated traffic demand for the various movements at the intersection of Pittwater Road and Jacksons Road. This is intended as a general guide to compare the future traffic demands, noting that in reality, changes on an individual approach at an intersection cannot generally be isolated from the remainder of the intersection. This is because changes to the physical infrastructure on one approach of the intersection can (for example) allow for amendments to signal timing, which can in turn result in changes to delays and queues on other approaches.

Table 4.3: Capacity Improvement Measures and Southern Buffer Traffic Contribution

	AM Peak Volume (vehicles/hour)	PM Peak Volume (vehicles/hour)	AECOM Mitigation Measure
Right Turn Bay Pittwater Road North			
Option 1	113	197	Increase bay from 50m to 200m
Option 2	384	454	Add 140m long second bay
Masterplan	176	296	-
Jacksons Road Westbound			
Option 1	203	346	-
Option 2	680	794	Add westbound lane
Masterplan	346	555	-
Jacksons Road Eastbound to Northbound			
Option 1	30	95	-
Option 2	97	221	Add left turn slip lane
Masterplan	57	145	-
Jacksons Road Eastbound to Southbound			
Option 1	57	154	-
Option 2	170	358	Remarking for double right turn lane
Masterplan	139	264	-

This comparison suggests that the full Option 2 mitigation measures may not be required at the intersection of Pittwater Road and Jacksons Road to result in acceptable Levels of Service during the peak hours. This is because the demand on the individual movements for which additional capacity is required would be lower than estimated for Option 2. More detailed assessment and consultation with RMS would be required to determine what mitigation measures would be appropriate.

Previous assessments suggest that the roundabouts (existing and proposed) along Macpherson Street would operate at good levels of service with spare capacity during peak hours with significantly increased traffic demands. The spare capacity available is thus very unlikely to be exceeded by the Masterplan traffic, and detailed assessments of the intersection operating conditions would be undertaken to confirm this as the development process proceeds.

The proposed roundabout at Boondah Road and Jacksons Road would no longer be required with the Masterplan, due to the proposed removal of the southern portion of Boondah Road. The most

appropriate intersection treatment for the intersection of the New Road with Jacksons Road would be determined as the development process proceeds, noting it lies adjacent to the existing roundabout at the Warriewood Centro access.

4.3 Impacts on Public Transport

As noted in Section 2.5, bus routes currently operate along Jacksons Road to the south of the Masterplan site and along Macpherson Street to the north of the Masterplan site. Current timetables may be supplemented by additional buses or routes should appropriate demand be demonstrated. The current and potential developments in the area, such as the Meriton Oceanvale Apartments, are likely to increase demand for public transport services.

Similarly, the Masterplan development is likely to increase demand for public transport, creating a retail/commercial/residential destination where there is only limited existing bus services. There is the potential for a future bus route to operate in a north-south direction using the modified road network, and it is recommended that the design of the new roads and intersections accommodate this.

4.4 Car Parking Requirements

Parking requirements for the Pittwater LGA are set out in Pittwater DCP 21 (Amendment 9), which has minimum on-site parking requirements for various land uses. The DCP treats multi-unit housing as being distinct from two and three storey residential flat buildings, however only specifies parking requirements for multi-unit housing, which it defines as having three or more dwellings. The Masterplan proposes a mix of residential building heights ranging from two storeys to seven storeys, thus the multi-unit housing definition does not align with the type of residential development proposed.

For other development types not specifically addressed in the DCP, Pittwater DCP 21 indicates that the minimum number of car parking spaces DCP "*must be determined using appropriate guidelines for parking generation and servicing facilities based on development type comparison based on the RTA* (now RMS) *Guide to Traffic Generating Development or analysis drawn from surveyed data for similar development uses*."

Table 4.4 therefore compares the proposed car parking rates for the Masterplan with those in both the Pittwater DCP 21 and the aforementioned RMS guidelines. The table uses the RMS rate for medium density residential development, which is higher than that for high density residential developments. The Masterplan is expected to comprise a mix of medium and high density residential.

Table 4.4: Parking Rates

	DCP 21 Rate	RMS Residential Rate	Proposed Rate
Residential	Multi-unit housing: 1 space/ 1 bedroom dwelling 2 spaces/2+ bedroom dwelling	Medium density: 1 space/1 bedroom unit 1.2 spaces/2 bedroom unit 2.0 spaces/3+ bedroom unit	2 spaces/dwelling
Residential Visitors	Multi-unit housing: 1 space/3 dwellings	Medium density: 1 space/5 dwellings	1 space/5 dwellings
Retail	1 space/30m² GLA	-	1 space/20m² GLA
Commercial	2.5 spaces/100m² GLA	-	2.5 spaces/100m² GLA
Community	Not specified	-	2.5 spaces/100m² GLA

Table 4.4 indicates that the proposed car parking provision would comply with or exceed the Pittwater DCP 21 minimum rates for all land uses, with the exception of residential visitor parking, which would comply with the RMS guideline for medium density residential developments. This is considered appropriate for the type of development proposed, and complies with the Council's requirement regarding development types not specified in DCP 21.

4.5 Other Parking Requirements

Pittwater DCP 21 also contains requirements for the provision of other parking and servicing, as follows:

- Multi-unit housing – provision for garbage collection, removalist vans and emergency vehicles
- Commercial – delivery vehicles 1 per 4,000m² where the GLA exceeds 400m²
- Commercial – courier spaces 1 plus 1 per 1,000m² where the GLA exceeds 400m²
- Commercial and Retail – provision of accessible spaces for people with disabilities appropriately signposted at the rate of 3% of required car parking spaces or part thereof
- Retail – adequate space for delivery vehicles
- Business developments (retail and commercial) – secure enclosed bicycle storage facilities within the building at the rate of 1 bicycle rack per 1,00m² GLA where the development is 200m² GLA or greater
- Residential – secure enclosed bicycle storage facilities within the building at the rate of 1 bicycle rack per 3 dwellings
- Business developments (retail and commercial) – motorcycle parking at a minimum rate of 1 motor cycle parking space per 100 motor vehicle spaces where the development is 200m² GLA or greater
- Residential – designated wash bay on the site where developments have more than ten units.

4.6 Parking Provision

Table 4.5 presents the required number of car parking spaces for each of the sub-sites, based on the proposed parking rates.

Table 4.5: Masterplan Proposed Minimum Car Parking

	Residential	Visitor	Commercial	Retail	Community	Total
Rate (spaces)	2 per dwelling	1 per 5 dwellings	2.5 per 100m² GLA	1 per 20m² GLA	2.5 per 100m² GLA	
Site A	78	8	-	-	-	86
Site B	230	23	-	402	-	655
Site C	70	7	-	87	-	164
Site D	292	29	55	338	26	740
Site E	-	-	90		-	90
Site F	40	4	-	52	-	96
Total	**710**	**71**	**145**	**879**	**26**	**1,831**

Assumes GLA approximately 75% of GFA

Comparing the total car parking spaces required with the estimated spaces available (Table 3.1), it is clear that sufficient space would be available to accommodate the proposed car parking. The additional requirements for bicycle parking, motor cycle parking and car wash bays would be adequately accommodated within the space available.

Delivery and service vehicle requirements would be designed as the development progresses, and would comply with the Pittwater DCP 21 guidelines.

All car parking and service vehicle areas would be designed in accordance with the relevant Australian Standards.

5. Summary and Conclusions

5.1 Summary

- The Masterplan development site lies within the Southern Buffer in the Warriewood Valley Planning Framework.
- Previous studies in the area have established appropriate mitigation measures to provide satisfactory road operating conditions with expected/planned development of undeveloped in the area. The most recent study is the *Warriewood Valley Strategic Transport Review* (AECOM, 2011) which assessed the implications of two levels of development in the Southern Buffer.
- The Masterplan site is served by the subarterial road network of Warriewood Valley, with direct links to the arterial roads which surround Warriewood Valley.
- Sydney Buses operates bus services to the north and south of the Masterplan site.
- The proposed Masterplan comprises a mixed use development with retail and commercial areas, residential apartments and a modified road network.
- The peak hour traffic generation potential of the Masterplan is estimated at 707 and 1,176 vehicle trips per hour during the morning and evening peak hours respectively.
- The potential traffic generation is more than that assessed in the Warriewood Valley Strategic Transport Review for Option 1 development of the Southern Buffer, and less than that assessed for Option 2.
- Due to the mix of the development and the modified road network, the Masterplan traffic would be distributed on the road system in a different pattern to that assessed by AECOM.
- The full Option 2 mitigation measures described by AECOM may not be required at the intersection of Pittwater Road and Jacksons Road to result in acceptable Levels of Service during the peak hours with the Masterplan development.
- Detailed assessment and consultation with RMS would be undertaken to determine the requirements for upgrading of this intersection with the Masterplan development.
- The Masterplan is likely to increase demand for public transport services, which may be supplemented by Sydney Buses as demand grows. It is recommended that the modified road network be designed to accommodate a north-south bus route through the site.
- The proposed provision of car parking is generally consistent with the Pittwater DCP 21 requirements, with residential visitor parking proposed in accordance with RMS rates as suggested by the DCP.
- Adequate space would be available to accommodate the proposed car parking, together with bicycle parking, motor cycle parking and service vehicle requirements. All parking and service vehicle areas would be designed in accordance with the relevant Australian Standards.

5.2 Conclusions

The proposed Masterplan development is generally consistent with previous planning for the Warriewood Valley area. Car parking would be satisfactorily accommodated within the site, and the modified road network would be constructed to be consistent with the Warriewood Valley Roads

Master Plan standards. With the Masterplan traffic, the need for upgrade works at the Pittwater Road intersection with Jacksons Road would be reduced from those identified by AECOM for Option 2 (Scenario 4) and consultation with RMS would be undertaken to assess the appropriate measures as the development process proceeds.

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