Strategy and Assets Committee

Meeting Date: Tuesday, 19 January, 2021
Location: Council Chambers, City Administrative Centre, Bridge Road, Nowra

Attachments (Under Separate Cover)

Index


BAY & BASIN SKATE PARK
SITE ANALYSIS & PRE-DESIGN CONSULTATION REPORT
SHOALHAVEN CITY COUNCIL
4 SEPTEMBER 2020
CONVIC

PREPARED BY

CONVIC

FOR

Shoalhaven City Council

QUALITY INFORMATION

PROJECT NAME	BAY & BASIN SKATEPARK
PROJECT NO.	20025
PREPARED BY	Alex Boyd
REVIEWED BY	Bryce Hinton

ACKNOWLEDGEMENTS

CONVIC Pty Ltd. Acknowledge the contributions of all those who participated in the pre-design consultation for the Bay & Basin Skate Park, including the Shoalhaven City Council staff and residents, community groups and other stakeholders who responded to the various opportunities for input and/or who provided advice and information where required.

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REVISION HISTORY

REVISION	REVISION DATE	DETAILS	AUTHORISED	
			NAME / POSITION	SIGNATURE
A	02.09.2020	REVISION A	BRYCE HINTON /DESIGN MANAGER	
B	04.09.2020	REVISION B	BRYCE HINTON /DESIGN MANAGER	

01

INTRODUCTION

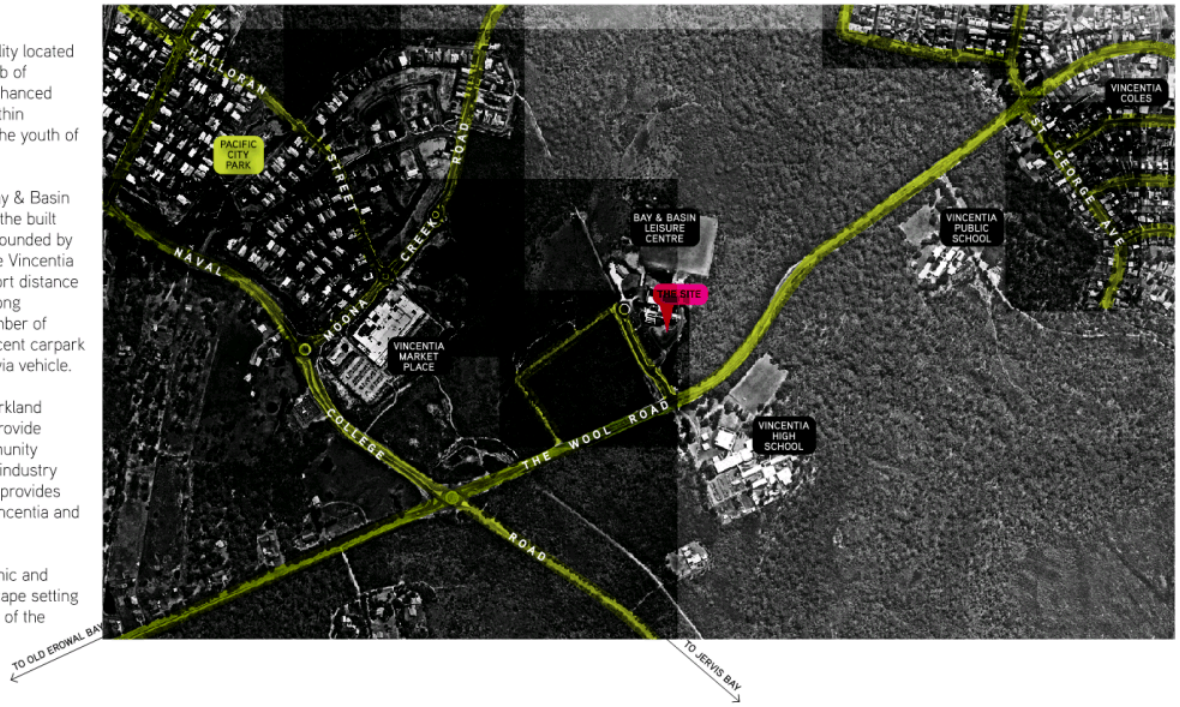
UNDERSTANDING SITE CONTEXT

The Shoalhaven City Council are proposing a new skate facility located adjacent to the Bay & Basin Leisure Centre within the suburb of Vincentia. The development of the skatepark will provide enhanced user experiences and create alternative active recreation within Vincentia's public open space forming a key destination for the youth of the local area and broader Shoalhaven municipality.

The proposed location sits adjacent to the heavily utilised Bay & Basin Leisure Centre, and is located on a portion of land south of the built form and north east of the existing carpark. The site is surrounded by native bushland that have a number of walking trails, and the Vincentia High School and Public School are both located within a short distance from the proposed development. The proposed site has strong connections with the leisure centre which will provide a number of ongoing activation opportunities for the facility with the adjacent carpark providing opportunities for end users to travel to the facility via vehicle.

The development of the proposed skatepark and broader parkland provides an opportunity for the Shoalhaven City Council to provide active recreation infrastructure that will become a key community asset and be a contemporary skate park that meets current industry trends. The space will be available to all demographics and provides opportunity to lift the public profile of the youth within the Vincentia and broader Shoalhaven community.

With the existing site features, the facility will create a dynamic and activated youth space with connections to the natural landscape setting offering recreational and social experiences for all members of the community to enjoy.



02

SITE ANALYSIS

SITE FEATURES

The site is located on The Wool Road adjacent to the highly utilised Bay and Basin Leisure Centre Park of which includes swimming pools, water play, a gym and an indoor sports centre.

The proposed site is a large open grass area that is often used as an overflow carpark and has a gentle south - north orientated slope. The asphalt carpark and access road network bordering the site is used by leisure centre patrons and provides opportunities for skate park users to utilise. Native bushland surrounds the Bay & Basin Leisure Centre with a local walking trails located in close proximity and the Vincentia High School is within five minutes walking distance.

There are several services that bisect the site, including water supply to the fire hydrant, and a large run of electrical conduits.

SITE ANALYSIS

VISUAL CONNECTIONS + CPTED PRINCIPLES

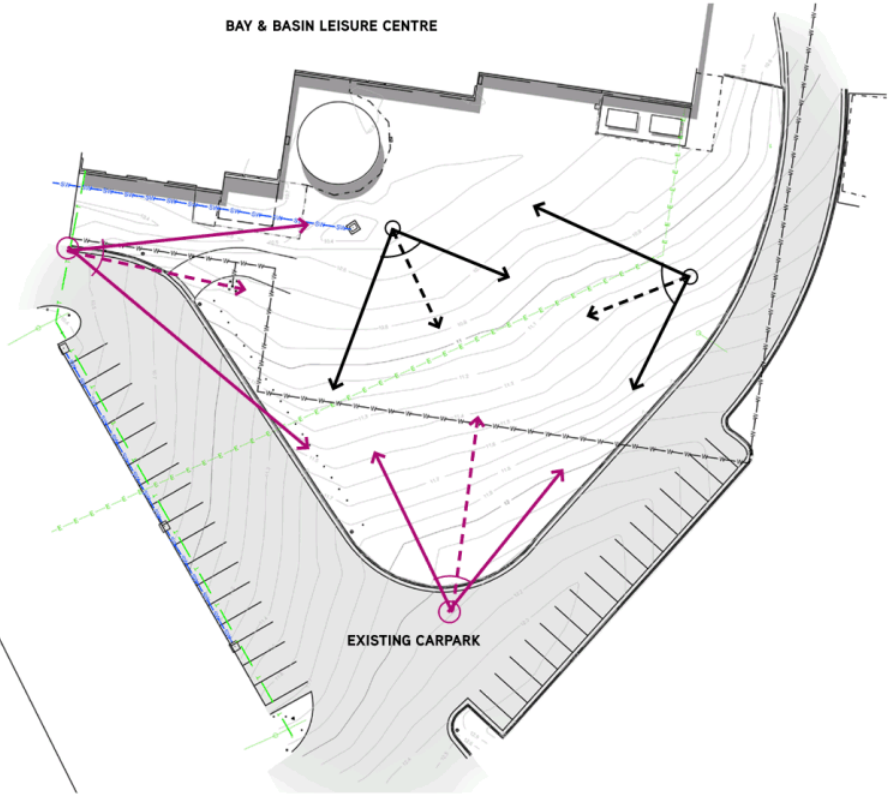
It is essential for the design of any youth facility to allow for and encourage clear views into, across, from and through the site.

This promotes passive and natural surveillance for the space and discourages anti-social behaviour. Due to the open nature and gentle slope of the site, vantage points into and out of the site occur in multiple locations and allow these effects to take place. It is important to take visual connections into consideration during the design phases and avoid creating enclosed out-of-site areas. Views from within the site out towards the street are to be maintained and enhanced throughout the conceptual development phase.

VISUAL CONNECTIONS

EXTERNAL VIEWS

INTERNAL VIEWS



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SITE ANALYSIS

TOPOGRAPHY, HYDROLOGY + ASPECT

The site grades from south-east to north-west towards The Bay & Basin Leisure Centre There is an existing stormwater pit located adjacent the water tank runs east-west towards the access road and provides connection opportunities for the facility drainage network.

The direction of the afternoon sun is from the West with some overshadowing from the Leisure Centre expected to occur in the late afternoon/evening time. Solar direction will be considered throughout the design process with the intention to reduce solar impact on end users and spectators.

ENVIRONMENTAL FACTORS

- 0.1M CONTOURS
- GRADE DIRECTION
- AFTERNOON SUN

SA21.9 - Attachment 1

SITE ANALYSIS

CIRCULATION + ACCESS

The site is highly accessible for users who are utilising the existing carpark. To provide a safe environment in a zone that will be shared by both pedestrians and vehicles, circulation and access into the proposed development will be considered throughout the design process. The recent completion of an enhanced access road into the Leisure Centre precinct has provided pedestrian paths linking the site with The Wool Road and Vincentia High School.

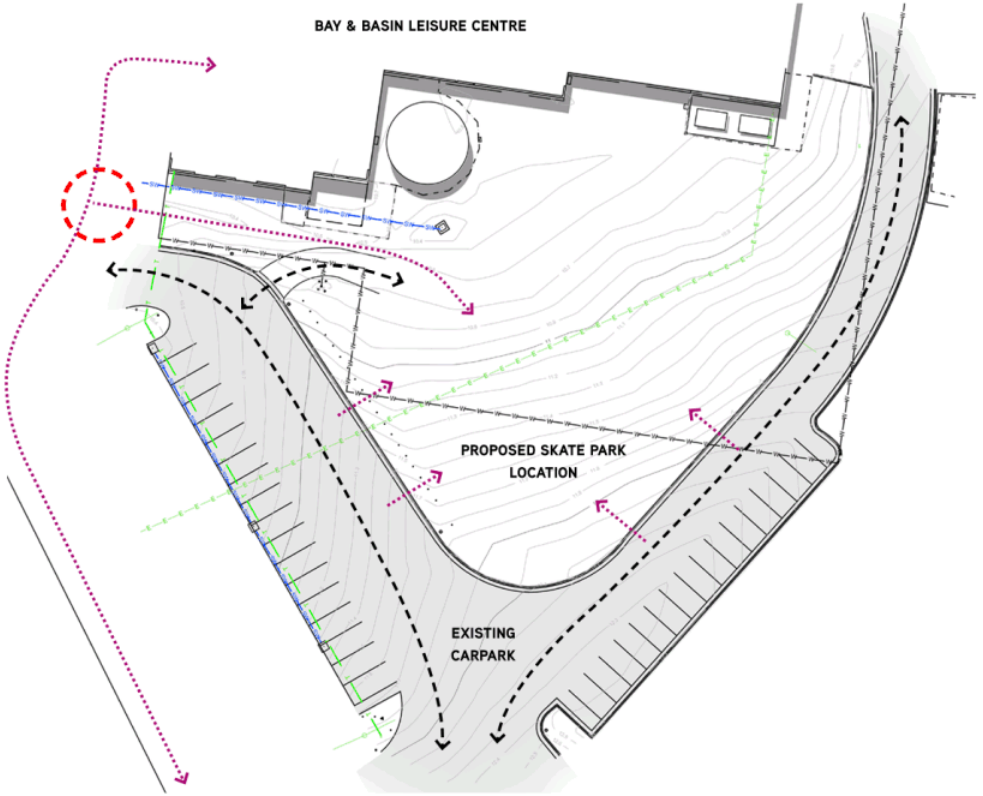
The location of the carpark pedestrian crossing and connection path into the Leisure Centre entrance forms a natural entry node at the junction of multiple desire lines of travel. This access opportunity is to be further investigated during concept design. .

MOVEMENT + CIRCULATION

PEDESTRIAN

VEHICLE

ENTRY NODES



SA21.9 - Attachment 1

03

SKATE CONTEXT

EXISTING SKATE CONTEXT

In order to determine the style of facility proposed for the proposed Bay & Basin Skatepark it is first important to undertake a study of skate facilities within a close proximity to the proposed development. This investigation reviews their park typology and identifies gaps in the surrounding regions skate park provision. Skate facilities consist of three distinct styles: plaza, transition and combination.

This study has identified that the region has a moderate number of facilities, all within an hours drive (80km) of the site. Convic have reviewed the majority of these facilities however skateparks that are significantly old or do not meet current standards (ie. prefabricated steel ramps on slab) have not being included within this contextual analysis.

Many of the existing parks are combination style skateparks offering their users a mix of different skate styles and skill levels. A small number of the existing facilities are old-style skateparks that consist of features that are outdated and not meeting current skate trends. It should be noted that within the past 12 months, two new facilities have been proposed including the Ulladulla Skatepark and Berry/Boongaree Skatepark.

With this in mind it is advised that a flowy combination style facility will be best suited for the new Bay & Basin Skatepark. Flow and street areas will provide a range of features for all rider styles and abilities. These features will have a preference to beginner and intermediate level riders but also include elements that can be used differently by the more experienced. This will create a facility that enables skill development and compliments the ever growing network of skateparks within the Shoalhaven munacipility and broader region.


SANCTUARY POINT SKATEPARK - 6KM S


CURRARONG SKATEPARK - 37KM NE


CULBURRA BEACH SKATEPARK - 42KM N


SHOALHAVEN HEADS SKATEPARK - 45KM N


MANYANA SKATEPARK - 45KM S


NEW BERRY SKATEPARK - 45KM N


NEW ULLADULLA SKATEPARK - 52KM S


SHELLHARBOUR SKATEPARK - 80KM N

04 CONSULTATION METHODOLOGY

APPROACH

The consultation process is an integral component of the development of youth spaces and skate facilities. In order to ensure the success and longevity of these key community assets it is crucial to engage with the future users of the space.

Due to the current social environment and social distancing practices Convic adapted their typical face-to-face community workshops to occur through an online platform as outlined below.

The community consultation ran for three weeks from the 20th July to 9th August. It comprised of a video designed to educate and inspire the community on possible inclusions for the new facility and provide insight into the project parameters, opportunities and constraints. This was followed by an online questionnaire that allowed the community to provide feedback for the facility based off the video.

THE COMMUNITY CONSULTATION AIMED TO:

- Engage with community members and key stakeholders before the design of the new skate space building excitement for the project.
- Inform participants of key design considerations of the project to build an understanding of the possibilities and restrictions.
- Inspire participants through past project examples illustrating the nature of contemporary skate parks with a variety of integrated, broader community usage options. To show not just skater only facilities, but to include a variety of elements such as, social gathering spaces, sculptural elements and other additional recreational opportunities, as well as illustrating the potential for activation and other community events.
- Gather user information and build user profiles.
- Gather community input into what they think the new facility should be.
- Receive feedback on the condition and functionality of the existing facility.
- Have community and users take ownership of the consultation process outcomes.

PROMOTIONAL SCOPE

The consultation aims to increase community awareness of the Bay and Basin Skate Park and to do so in an open, public and transparent process. The online advertising campaign included the sharing of the digital flyer on Convic's social media pages, through local business's contacts and councils social media networks.

Consultation flyer

DATA HANDLING AND ANALYSIS

The data handling and analysis has been carried out by CONVIC. The workshops were designed to increase inclusiveness and generate data for analysis and development into themes and direct design response. All participants were initially informed of workshop objectives and how the information provided would be utilised to inform the concept design process.

All responses are treated in confidence, to ensure the anonymity of respondents. In line with Convic's privacy policy, no identifying information is included with any responses included in this report.

REPRESENTATION

The views collected in this report are not statistically validated, however they represent the views of user groups and community members. Themes presented in this report are derived from workshop contributions.

05

DEVELOPING USER PROFILES

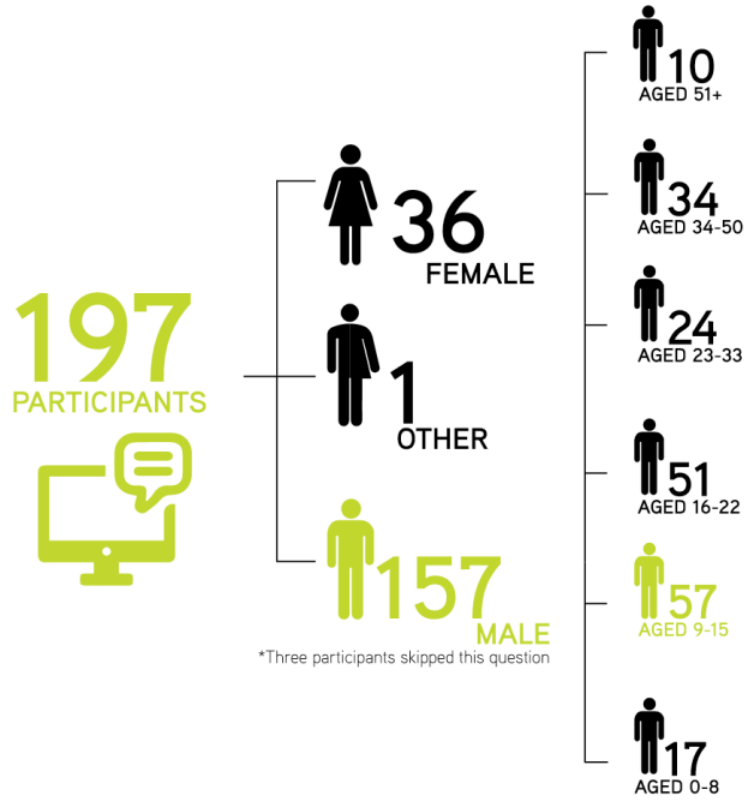
QUESTIONNAIRE SURVEY RESULTS

The following pages summarise the key results derived from the questionnaire undertaken by community members as part of the online consultation.

The results are an overview of the community profile of participants. Understanding the demographic patterns and trends within the community via the analysis of this data helps to inform the vision and typology of the proposed skate facility.

The questionnaire saw a total of **197 RESPONSES**. The following info graphics represent the information collected through the pre-design consultation online survey.

The online survey captured a majority age group of **9-15** and **16-22** indicating that the key stakeholders will be teenage males. There was a high number of users aged between 34-50 which indicates that there is a number of older generation riders within the region.



DEVELOPING USER PROFILES

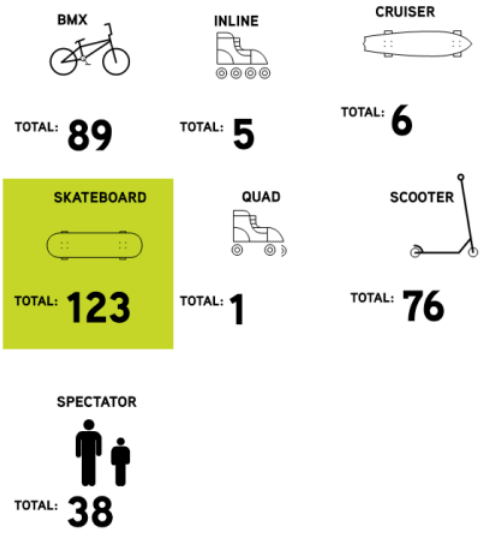
WHERE DO YOU LIVE?

The majority of participants live in Vincentia in close proximity to the site. There is also an even distribution of participants spread throughout the surrounding suburbs, most **WITHIN A 30MIN DRIVE** from the existing skate park.

*Four participants skipped this question

WHAT ACTIVITIES WILL YOU BE INVOLVED IN?

Different skate parks may favour different users. As an example, jumps boxes more often appeal to scooter and BMX riders, whereas ledges, rails and bowls often appeal more so to skateboarders. With this understanding, the questionnaire identified the **MAJORITY OF RESPONDENTS AS SKATEBOARDERS.** There were also a high number of BMX and scooter riders. This indicates that the park may take on a style that appeals to different user types.

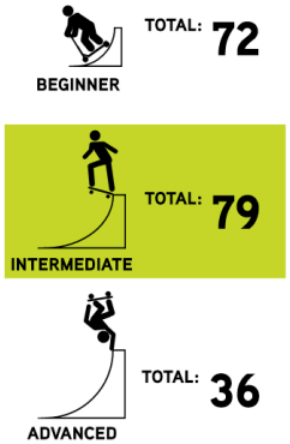


*22 participants selected other for this question

HOW WELL DO YOU RIDE?

There was a relatively **EVEN SPREAD OF USER ABILITIES** within the consultation, while **INTERMEDIATE** was the most common response, beginner and advanced level users received high numbers of responses.

It is key to provide obstacles for beginner users as well as **SKILL PROGRESSION** within any skate facility. This is to allow for beginner users to start out at a new sport and future generations to learn and continue ongoing progression up to an advanced skill level. It is also important for more advanced users to continue to be challenged and maintain interest. This is achieved by providing a number of multi-purpose features and obstacles that have applications for varying skill levels.

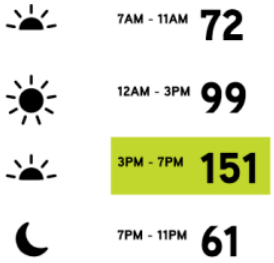


*10 participants skipped this question

DEVELOPING USER PROFILES

WHAT TIME DO YOU RIDE?

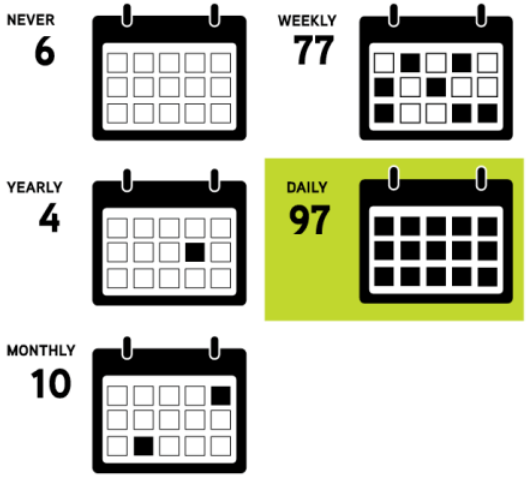
The results show participants would typically utilise the facility between **3PM AND 7PM.** Generally the questionnaire has identified that local facilities are in constant use throughout the day by different user groups, illustrating that the proposed skate space design will need to consider provision for amenity to support functionality throughout the day and night.



*Four participants skipped this question

HOW OFTEN DO YOU RIDE?

The majority of participants have been identified as active users, with **MOST RIDING ON A DAILY BASIS.** Weekly use of the facility also featured highly amongst response. This illustrates a high number of participants that will directly utilise the facility regularly in the future and the high volume of users will need to be considered during the design phases.



*Three participants skipped this question

WHERE IS YOUR FAVOURITE PLACE TO ROLL AND WHY?

The results show each location that was mentioned within the participants answers - the bigger the text the more times it was mentioned. Participants were allowed to detail a number of different parks and locations that they currently consider their favourite.

Many of the responses outlined the Cullburra Skatepark as their favourite place to roll, this is most likely due to it being close by and relatively new. Shoalhaven Heads Skatepark and the Sanctuary Point Skatepark was also a popular response, as both facilities are close by and contain features for different skill levels. The Coles carpark also appears to be a popular place to utilise due the lack of facilities within the Vincentia area.

GATHERING IDEAS

WHAT ACTIVITIES / FACILITIES WOULD YOU LIKE TO SEE INCLUDED IN THE SKATE PARK?

SHADE, SEATING AND LIGHTING WERE SEEN AS A HIGH PRIORITY by many members of the community with a number of participants highlighting them as an integral inclusion within the space now or within future stages. Demo's and competitions, public art opportunities and parkour or climbing features were also seen as important to participants.

PUBLIC ART / ART WALL

TOTAL: **78**

HANG OUT SPACES

TOTAL: **85**

SEATING FOR SPECTATING

TOTAL: **102**

SHADE

TOTAL: **133**

DEMOS & COMPETITIONS

TOTAL: **82**

LEARN TO RIDE WORKSHOPS

TOTAL: **68**

TABLE TENNIS

TOTAL: **40**

NIGHT TIME USE

TOTAL: **141**

PARKOUR AND CLIMBING

TOTAL: **91**

*Participants were allowed to vote more than once.

GATHERING IDEAS

WHAT IS YOUR FAVOURITE STYLE OF SKATE PARK?

Participants were asked to vote for which style of park they prefer the most, with majority selecting **FLOWY TRANSITION**.

Looking at park styles in more detail it appears that **STREET SKATE PARK, FLOWY STREET AND TRADDITIONAL** are also favoured for different skate typologies.

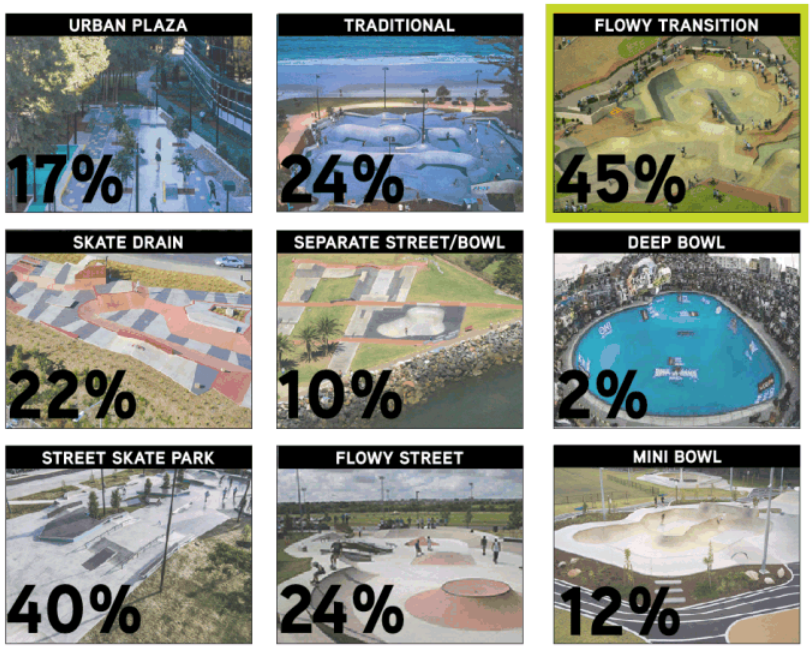
The design will look to incorporate a typology that is a combination of both flowy and street styles of skate. It is also important to consider what other facilities in the region already provide as to not replicate features and ensure the proposed design fits into the existing skate park network.

BOWL + TRANSITION
TOTAL: 43

STREET + PLAZA
TOTAL: 53

STREET + TRANNY
TOTAL: 86

*15 participants skipped this question



*Ten participants skipped this question

GATHERING IDEAS

IF YOU COULD HAVE ONE UNIQUE SKATE FEATURE IN THE DESIGN WHAT WOULD IT BE?

A mix of features were suggested but the majority showed a **PREFERENCE FOR TRANSITION AND STREET-BASED FEATURES SUCH AS A MINI RAMP, BOWL, PUMP TRACK MINI BOWL AND RAILS.** Standout skate features have been listed below.

WHAT DO YOU FIND SPECIAL OR ICONIC ABOUT THE VINCENTIA REGION THAT SHOULD BE CONSIDERED IN THE DESIGN?

There was a variety of replies to this question with many participants coming up with unique and creative responses. Many ideas discussed concepts around the significance of the regions native flora and fauna including design ideation based on the iconic **WHITE SANDY BEACHES** within the area. Additional comments are expressed in the word cloud below:

CAN YOU THINK OF ANYTHING WE HAVE MISSED?

There was a variety of replies to this question with many participants reenforcing previous comments which were made or sharing their excitement and support for the project. Ideas discussed concepts around including **TOILETS, FAMILY FRIENDLY, A WATER STATION OR DRINKING FOUNTAIN, LIGHTS AND IMPROVING NATURAL SURVEILLANCE.** Additional comments are expressed in the word cloud below:

UPLOADED IDEAS + SKETCHES

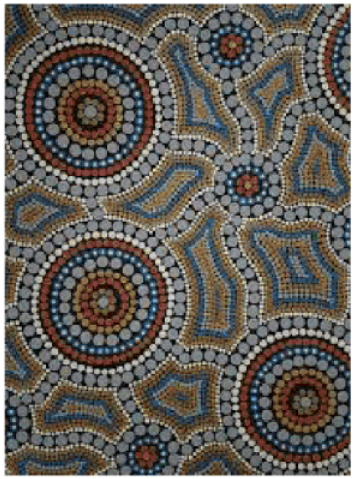
UPLOADED IDEAS + SKETCHES

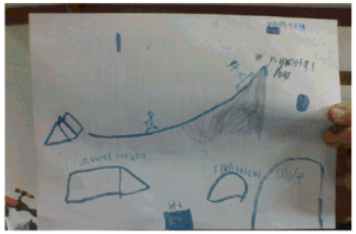
The survey allowed participants to upload images, sketches and ideas for the proposed Bay & Basin Skatepark. At this point, participants are immersed in the consultation process and have been inspired and educated throughout the online video and survey of the possibilities for inclusions within the facility. Users are directly involved in creating ideas and the decision making process. This builds a community-based response to the process and develops a sense of value in ideas and opinions which engenders ownership of the process.

Many participants uploaded images of what they would like to see in the flowy transition area, including the inclusion of multiple large bowls, a pump track and jumps boxes and spines. In addition one user uploaded an image of local indigenous art that could influence the design and layout of the space or could be used to provide the facility with a cultural identity.

STANDOUT IDEAS CENTRED AROUND THE FOLLOWING KEY THEMES

- An mini and intermediate level bowl.
- The inclusion of a pump track to the peripheral of the facility.
- The provision of functional lighting around the facility.
- Mix of beginner to intermediate obstacles and clear zones for users, provides safety and allows for greater user capacity.
- Focus the skate area on a mix of street and transition style riding with obstacles suited to all users.





06

CONSULTATION SUMMARY

THE PROPOSED BAY & BASIN SKATE PARK WILL PROVIDE ADDITIONAL ACTIVE RECREATIONAL OPPORTUNITIES FOR ALL AGES AND ABILITIES WITHIN THE VINCENTIA AND BROADER COMMUNITY. THE FACILITY WILL BE MULTI-DISCIPLINE, CATER TO ALL WHEELED SPORTS AND SKILL LEVELS THAT IS CONTEMPORARY AND MEETS CURRENT INDUSTRY TRENDS.

ACTIVE SPACE INTERVENTIONS WITHIN THE SHOALHAVEN MUNICIPALITY WILL PROVIDE KEY COMMUNITY ASSETS THAT WILL BE UTILISED BY BOTH THE CURRENT AND FUTURE GENERATIONS, ENHANCING SOCIAL INTERACTIONS AND PROVIDE ENJOYABLE AND MORE LIVEABLE COMMUNITIES.

CONSULTATION SUMMARY

The pre-design consultation outcomes have been summarised to inform a community driven design brief for the proposed Bay & Basin Skatepark. The information collected from the online survey has informed this brief. These are outlined thematically and will be used as the foundation for the development of the concept design.

TARGET USER GROUP

The community feedback has highlighted skateboarders as the majority of users. It will however, cater to all user groups including those participating in BMXing, scooter, roller skating and all other active wheeled sport disciplines, as well as those non-active participants looking to spectate and enjoy the public space.

SKILL LEVEL PROVISION

There was a relatively even spread of abilities within the consultation while intermediate was the most common response, beginner and advanced level users were also well represented. It is key to provide for skill progression within the facility. This will allow for beginner users and future generations to learn and continue ongoing progression up to an advanced skill level and for advanced users to continue to be challenged and remain interested.

SKATE TYPOLOGY

A clear preference for a mixed facility of street and transition style elements was indicated by the majority of participants. The design will look to work in conjunction with the features found at existing facilities within the region to create a complimentary network of skateparks and active recreation spaces throughout the Shoalhaven munacipility.

SKATE VISION

The majority of riders favour a combination of flowy transition and street style. The facility design will therefore respond to community desires, offering a variety of features that cater to all styles of skate. With flowing transition and street features being incorporated as a key design consideration.

Standout features highlighted by the community were a mini ramp, mini bowl, big bowl, round rails, and spine. There were a high number of votes for the facility to include a pump track. The inclusion of this will be dependant on project parameters such as budget and existing site conditions. In addition to the specific features, there was an interest in community activation events such as the facility being designed to attract skate competitions and demonstrations and be capable of holding learn to ride workshops. The design proposal of the space will consider connecting elements suitable for the provision of such events.

USER + SPECTATOR AMENITIES

To ensure a central community space that can be used by a variety of different user groups, the facility will offer a number of social opportunities. The provision for areas of refuge and shade throughout the day is to be considered, whether purpose built or looking to utilise natural shade. Many highlighted the need for drinking fountains and lighting. This will be considered when developing the concept design and reviewing the project parameters such as the facility budget.

ICONIC ELEMENTS + LOCAL IDENTITY

To celebrate the Vincentia area and broader Shoalhaven region the design process will investigate different opportunities to provide the facility with its own identity. Community members highlighted the natural landscape character of the region including the local beaches and native bushland as items that could influence the parks identity. Theming will be further tested during the concept phase of the project, as this will create a more enjoyable place to inhabit and provide local riders with a sense of ownership and stewardship.

07

NEXT STEPS

MOVING FORWARD

Upon review and approval of this consultation summary report, a draft concept will be developed that responds to the key findings and community requirements identified. This concept will be costed to ensure it is within the project parameters and be used to consult with the community providing a full circle approach to the involvement of key end users within the design process.

As well as creating a truly relevant design, this review will ensure the final concept design reflects community needs, user requirements and the overall project vision. This continued involvement connects the community with the project design process and ultimately creates a vested interest in the final outcome. This engenders community pride and ownership in both the process and the public facility, creating a strong sense of stewardship of the community's public spaces.

SA21.9 - Attachment 1


BAY & BASIN SKATE PARK
DRAFT CONCEPT DESIGN REPORT
SHOALHAVEN CITY COUNCIL
04 NOVEMBER 2020
CONVIC

ACKNOWLEDGEMENTS

Convic Pty Ltd. acknowledge the contributions of all those who participated in the prior phases of the Bay & Basin Skate Park project, including the Shoalhaven City Council staff, residents, community groups and other stakeholders who responded to the various opportunities for input and/or who provided advice and information where required.

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REVIEWED BY	Bryce Hinton

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REVISION HISTORY

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			NAME / POSITION	SIGNATURE
A	04.11.20	DRAFT REPORT	BRYCE HINTON/ DESIGN MANAGER	

CONTENTS

01

INTRODUCTION

BACKGROUND

A draft concept design has been prepared for the Bay and Basin Skate Park in response to the feedback and comments provided by the end users and key stakeholders during the pre-design community engagement phase. The design has been developed to create a unique, iconic and site responsive facility that aims to complement the existing active recreational facilities within the Shoalhaven municipality. Once delivered, this facility will become a hub for the Vincentia youth and broader community, attracting alternative recreation participants from the wider Shoalhaven Region.

The Bay and Basin Skate Park design proposal creates a community space through the use of place making principles which forms a strategic park of the municipality's public realm. The facility is inviting to all members of the community and provides safe people watching opportunities within and around the Bay and Basin Leisure Centre precinct. The concept design maximises user numbers by allowing for a mix of demographics and provides a space that is truly reflective of the community needs and requirements.

The draft concept design provides a family friendly and aesthetically pleasing space that responds to the existing site constraints and opportunities, and enhances the existing natural landscape characteristics of the site and surrounding area. In addition to this, the facility caters to a variety of user styles, supports a wider age audience and their ongoing skill development.

02

SITE CONTEXT

UNDERSTANDING SITE CONTEXT

The proposed location sits adjacent to the heavily utilised Bay & Basin Leisure Centre, and is located on a portion of land south of the built form and north east of the existing carpark. The site is surrounded by native bushland that has a number of walking trails, and the Vincentia High School and Public School are both located within a short distance from the proposed development. The proposed site has strong connections with the leisure centre, which will provide a number of ongoing activation opportunities for the facility, with the adjacent carpark providing opportunities for end users to travel to the facility via vehicle.

The development of the proposed skate park and broader precinct provides an opportunity for the Shoalhaven City Council to provide active recreation infrastructure that will become a key community asset and be a contemporary skate park that meets current industry trends. The space will be available to all demographics and provides opportunity to lift the public profile of the youth within the Vincentia and broader Shoalhaven community.

With the existing site features, the facility will create a dynamic and activated youth space with connections to the natural landscape setting offering recreational and social experiences for all members of the community to enjoy.

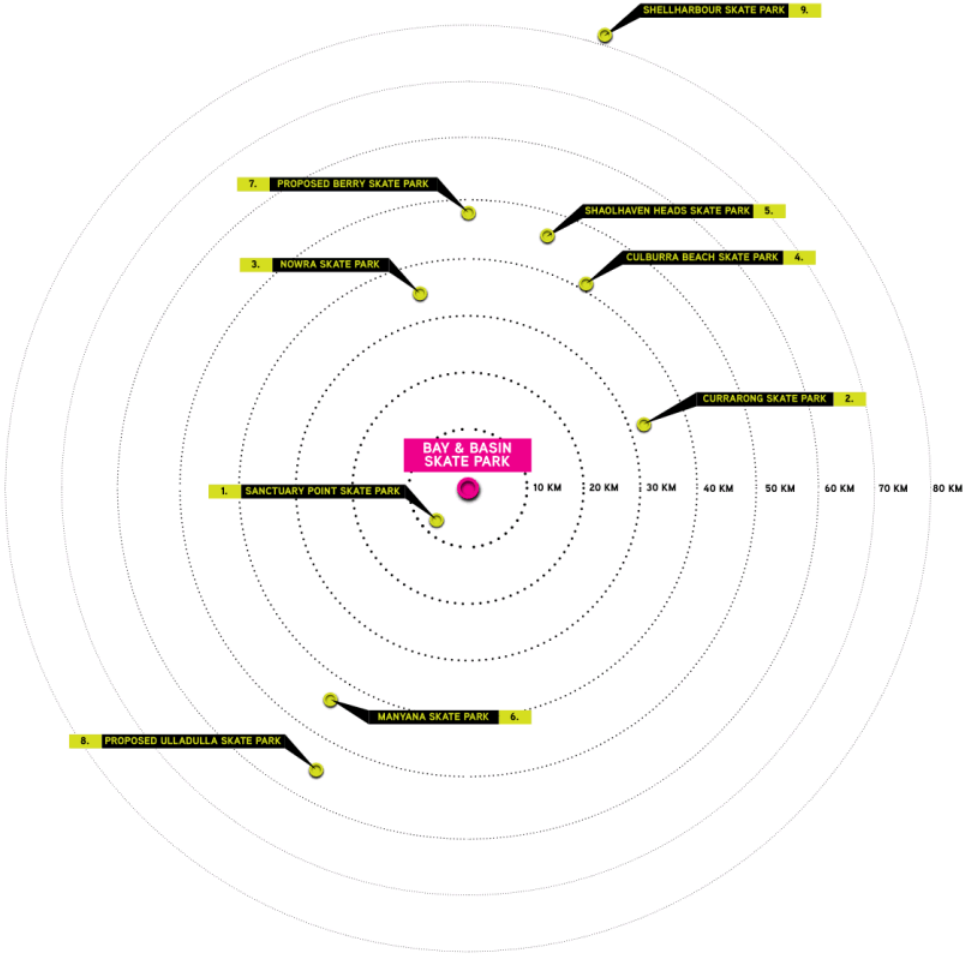
03

UNDERSTANDING SKATE CONTEXT

EXISTING SKATE NETWORK

The Shoalhaven City Council have recently started the process of developing a number of sites into new or refurbished skate facilities. When completed these facilities will provide the community with a number of world class and contemporary skate parks. This will result in the skate and alternative active recreation scene being highly established within the Shoalhaven City municipality, and the greater New South Wales region.

As a result of this desktop study a design can be developed for the Bay and Basin Skate Park that further enriches the existing skate space infrastructure within the region and provide a network of facilities that offer end users a variety of skate park typologies and features.



UNDERSTANDING SKATE CONTEXT

EXISTING SKATE CONTEXT

In order to determine the style of facility proposed for the proposed Bay & Basin Skate Park it is first important to undertake a study of skate facilities within a close proximity to the proposed development. This investigation reviews their park typology and identifies gaps in the surrounding regions skate park provision. Skate facilities consist of three distinct styles: plaza, transition and combination.

This study has identified that the region has a moderate number of facilities, all within an hours drive (80km) of the site. Convic have reviewed the majority of these facilities, however skateparks that are significantly old or do not meet current standards (ie. prefabricated steel ramps on slab) have not being included within this contextual analysis.

Many of the existing parks are combination style skateparks offering their users a mix of different skate styles and skill levels. A small number of the existing facilities are old-style skateparks that consist of features that are outdated and not meeting current skate trends. It should be noted that within the past 12 months, two new facilities have been proposed including the Ulladulla Skate Park and Berry/Boongaree Skate Park.

With this in mind it is advised that a flowy combination style facility will be best suited for the new Bay & Basin Skate Park. Flow and street areas will provide a range of features for all rider styles and abilities. These features will have a preference to beginner and intermediate level riders but also include elements that can be used differently by the more experienced. This will create a facility that enables skill development and compliments the ever growing network of skate parks within the Shoalhaven municipality and broader region.


SANCTUARY POINT SKATEPARK - 6KM S


CURRARONG SKATEPARK - 37KM NE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SHOALHAVEN HEADS SKATEPARK - 45KM N


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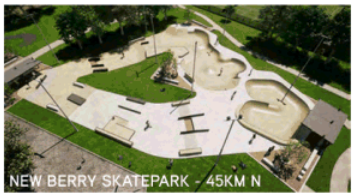
NEW BERRY SKATEPARK - 45KM N


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SHELLHARBOUR SKATEPARK - 80KM N

04

DESIGN VISION

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ACTIVE SPACE INTERVENTIONS WITHIN THE SHOALHAVEN MUNICIPALITY WILL PROVIDE KEY COMMUNITY ASSETS THAT WILL BE UTILISED BY BOTH THE CURRENT AND FUTURE GENERATIONS, ENHANCING SOCIAL INTERACTIONS AND PROVIDE ENJOYABLE AND MORE LIVEABLE COMMUNITIES.

CONSULTATION SUMMARY

The pre-design consultation outcomes were summarised to inform a community responsive design brief for the proposed Bay & Basin Skate Park. The information collected from the online survey has informed this brief. These are outlined thematically and will be used as the foundation for the development of the concept design.

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The community feedback has highlighted skateboarders as the majority of users. It will however cater to all user groups, including those participating in BMX, scooter, roller skating and all other active wheeled sport disciplines, as well as those non-active participants looking to spectate and enjoy the public space.

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There was a relatively even spread of abilities within the consultation. While intermediate was the most common response, beginner and advanced level users were also well represented. It is key to provide for skill progression within the facility. This will allow for beginner users and future generations to learn and continue ongoing progression up to an advanced skill level and for advanced users to continue to be challenged and remain interested.

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The majority of riders favour a combination of flowy transition and street style. The facility design will therefore respond to community desires, offering a variety of features that cater to all styles of skate. With flowing transition and street features being incorporated as a key design consideration.

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To celebrate the Vincentia area and broader Shoalhaven region the design process will investigate different opportunities to provide the facility with its own identity. Community members highlighted the natural landscape character of the region including the local beaches and native bushland as items that could influence the parks identity. Theming will be further tested during the concept phase of the project, as this will create a more enjoyable place to inhabit and provide local riders with a sense of ownership and stewardship.

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DESIGN IDEATION

CONCEPT IDEATION

The draft concept design is inspired by the iconic coastal location of Vincentia and the nearby picturesque sandy shores that surround it.

Situated in such close proximity to the Bay & Basin Leisure Centre it is key for the design of the skate park to compliment the design language of the leisure centre and form part of a holistic precinct, helping to develop a larger more inviting community asset.

The concept design uses sandy and earthy tones, natural rock and stone materials combined with vibrant coping highlights that draw inspiration from the material use in the footpath connections and landscape features around the leisure centre.

This unique combination of material use and colours forms a unique destination within the local and wider regional context.

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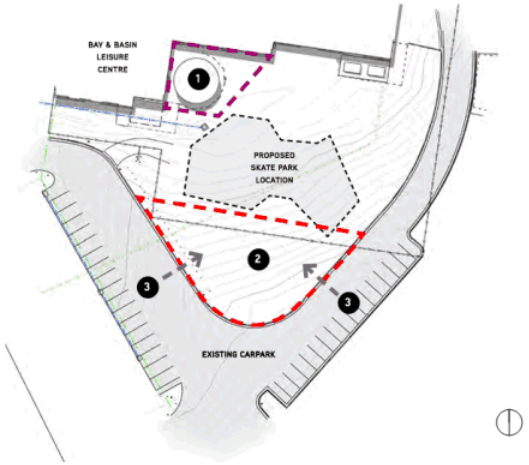
CONCEPTUAL EVOLUTION



SITE CONSTRAINTS

The site proposed for the Bay and Basin Skate Park poses a number of site constraints that have been addressed throughout the draft concept design phase of the project.

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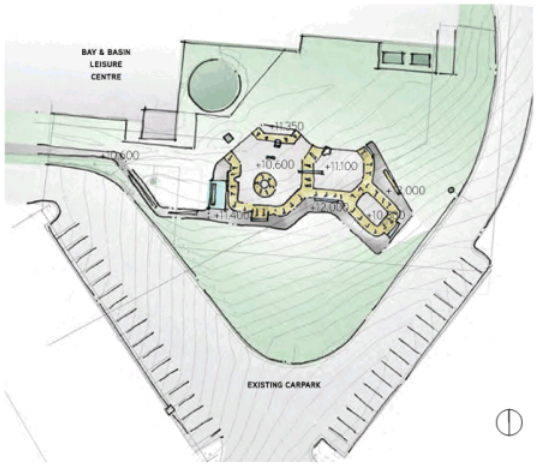
3. A lack of connections from the southern end of the car park to the proposed skate park could result in a number of informal access points and unwanted desire lines.

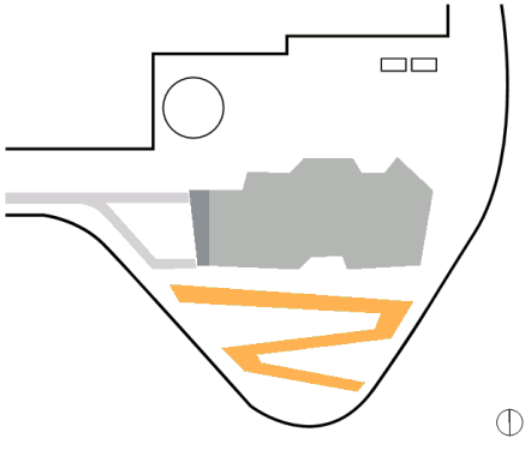


SKETCH DESIGN

The sketch design for the Bay and Basin Skate Park is a flowy transition style park that responds to the feedback obtained from the community during the pre-design consultation events. The skate features are tailored towards beginner and intermediate skill levels with some features included that provide the ability for more advanced riders to enjoy the park too.

The design responds to the site conditions by centrally locating the facility within the site offset from the back of the leisure centre and away from existing underground services while providing enhanced pedestrian access into and around the facility.

The materials and colour palette are inspired by the existing Leisure Centre and costal location to create visual links and form an integrated recreation precinct.



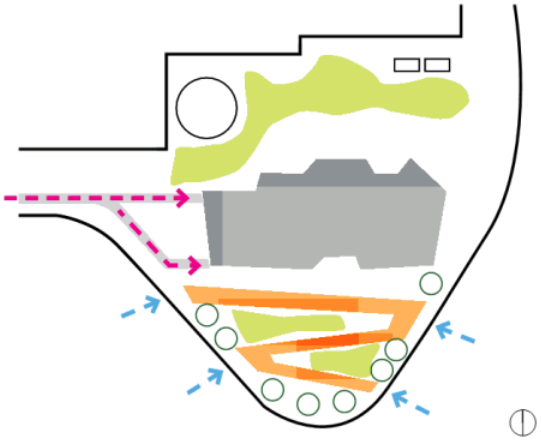
DRAFT CONCEPT DESIGN

The development of the draft concept design has improved pedestrian circulation through and around the site with more resolution provided to areas for spectators and the way that non active users will interact with the facility. Passive and landscape features populate the south area of the site that is not suitable for the skate park development.

The facility design has been rationalised to further enhance natural surveillance into the site with adjustments made to the location of the mini bowl that integrates better with existing levels and underground service locations.

Further development of the edge conditions has been investigated to prevent vehicle access into the park and better refine the edge between the vehicle and pedestrian zones.

CONCEPTUAL DIAGRAMS

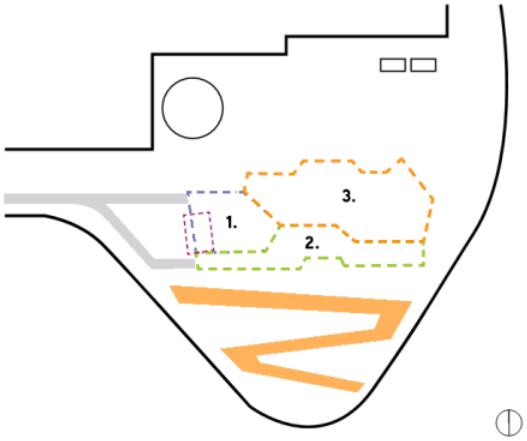


MULTIPLE POINTS OF ACCESS

Multiple informal access points compliment the primary connection points and encourage passive uses and spectators into the space.

The primary access points provide direct connections to the leisure centre and the existing path network. Whilst the more informal access points allow passive uses to easily access the soft spaces and utilise the seating and viewing areas.

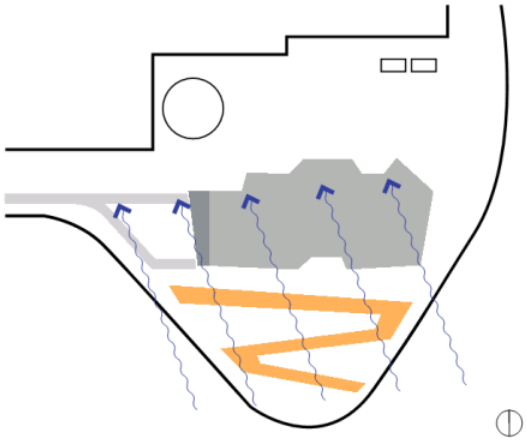
Areas of sturdy planting and trees direct user movements and circulation between active and passive areas and away from back of house areas within the site as well as providing a buffer between the site and car park.



INDIVIDUAL AREAS OF SKATE

The draft design concept offers a number of different skate styles with a preference toward flowy transition with the inclusion of a mini bowl to reflect the pre-design community consultation findings.

The skate park can be used as one larger open skate area on quieter days or as 3 key individual areas on busier days to accommodate a range of user abilities and style preferences.



TIERED SKATE DESIGN

A tiered skate design utilises the natural fall of the site and promotes key sight lines from the car park, surrounding pathways and spectator spaces positioned higher up the site.

Within the skate park the mini bowl sits higher up the site to minimise the need for earth batters on the southern side and maximise passive surveillance.

CONCEPT

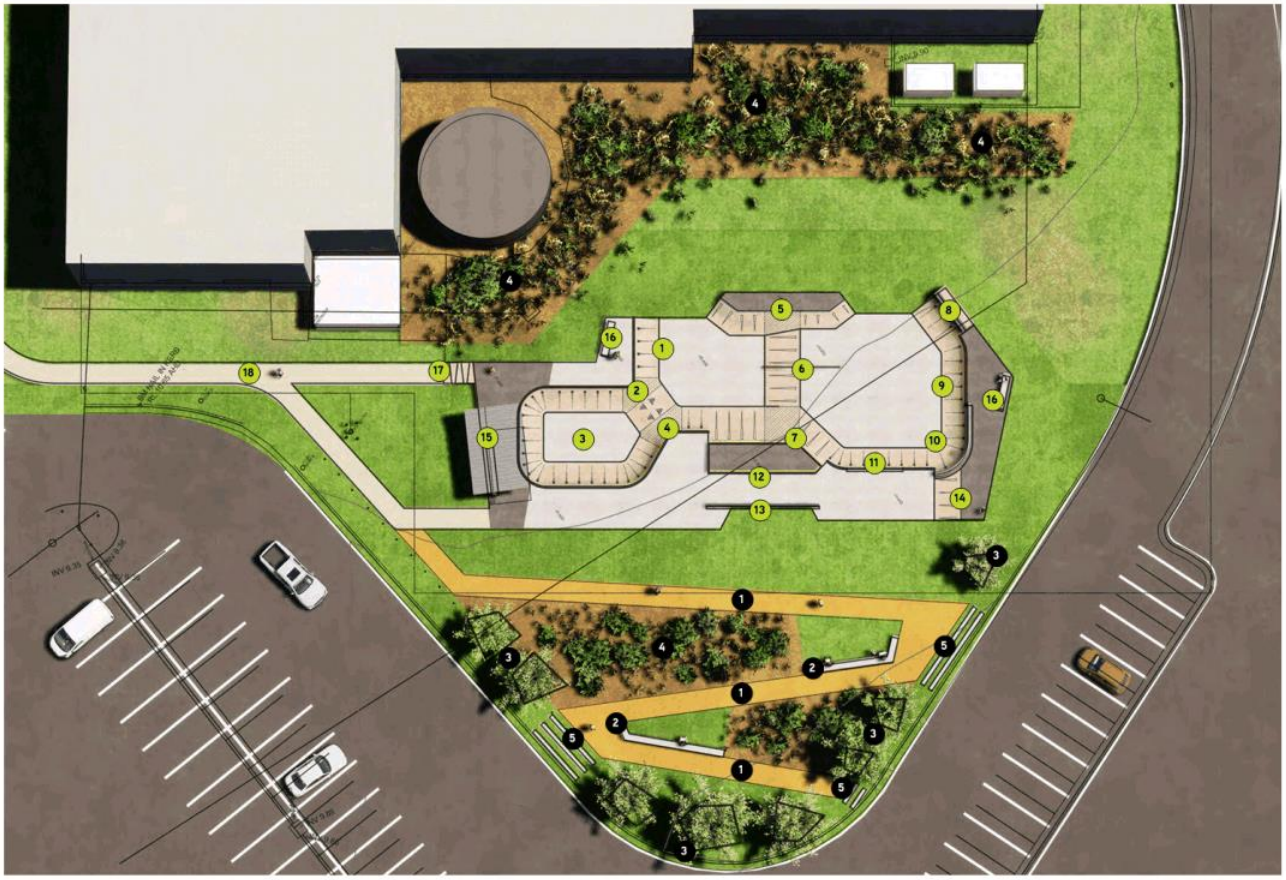
LEGEND

SKATE WORKS

1. Quarter Pipe 1000H
2. Rounded Transition Hip + Mogul
3. Mini Bowl Area 1000H
4. Sharp Transition Hip + Mogul
5. Hipped 'China Bank' 1200H
6. Flat & Doen Rail
7. Flat Bank Hip with Ledge 600 - 1200H
8. Quarter Pipe Extension 1500H
9. Quarter Pipe 900H
10. Corner Extension with Love Seat
11. Quarter Pipe to Slappy Kerb
12. Flat Ledge 350H
13. Kerb Slider over Garden Gap 400H
14. Flat Bank 400H
15. Shade Shelter
16. Concrete Seats
17. Entrance Steps
18. Entrance Paths

PROVISIONAL LANDSCAPE WORKS

1. Soft Finish Footpath
2. Spectator Seating
3. Planters with Trees
4. Sturdy Planting Areas
5. Concrete Steppers



CLIENT:	DESIGNER:	SCALE: 1:300 @ A3	PROJECT:	TITLE:	DATE:	REVISION:
Shoalhaven City Council	CONVIC	0m 3m 15m / 1.5m 7.5m 30m	BAY & BASIN SKATE PARK	DRAFT CONCEPT PLAN	30.10.2020	A

CONCEPT

PERSPECTIVE - 01

CONCEPT

PERSPECTIVE - 02

CONCEPT

PERSPECTIVE - 03

SA21.9 - Attachment 2

07

CONCLUSION

MOVING FORWARD

Upon Council endorsement of the draft concept design a community presentation video and survey will be produced and presented online where community members can provide comments on the design and workshop ideas to include in the final concept design. As well as creating a truly relevant design, this input will ensure the final concept design reflects community needs, user requirements and the overall project vision.

SA21.9 - Attachment 2


BAY & BASIN SKATE PARK
FINAL CONCEPT DESIGN REPORT
SHOALHAVEN CITY COUNCIL
16 DECEMBER 2020
CONVIC

ACKNOWLEDGEMENTS

Convic Pty Ltd. acknowledge the contributions of all those who participated in the prior phases of the Bay & Basin Skate Park project, including the Shoalhaven City Council staff, residents, community groups and other stakeholders who responded to the various opportunities for input and/or who provided advice and information where required.

QUALITY INFORMATION

PROJECT NAME	BAY & BASIN SKATE PARK
PROJECT NO.	20025
PREPARED BY	Alex Boyd
REVIEWED BY	Bryce Hinton

PREPARED BY

CONVIC

FOR

Shoalhaven City Council

REVISION HISTORY

REVISION	REVISION DATE	DETAILS	AUTHORISED	
			NAME / POSITION	SIGNATURE
A	16.12.20	FINAL CONCEPT REPORT	BRYCE HINTON/ DESIGN MANAGER	

CONTENTS

01

INTRODUCTION

BACKGROUND

The final concept design has been prepared for the Bay and Basin Skate Park in response to the feedback and comments provided by the end users and key stakeholders during the pre-design and draft concept community engagement phase. The design has been developed to create a unique, iconic and site responsive facility that aims to complement the existing active recreational facilities within the Shoalhaven municipality. Once delivered, this facility will become a hub for the Vincentia youth and broader community, attracting alternative recreation participants from the wider Shoalhaven Region.

The Bay and Basin Skate Park design proposal creates a community space through the use of place making principles which forms a strategic part of the municipality's public realm. The facility is inviting to all members of the community and provides safe people watching opportunities within and around the Bay and Basin Leisure Centre precinct. The concept design maximises user numbers by allowing for a mix of demographics and provides a space that is truly reflective of the community needs and requirements.

The final concept design provides a family friendly and aesthetically pleasing space that responds to the existing site constraints and opportunities, and enhances the existing natural landscape characteristics of the site and surrounding area. In addition to this, the facility caters to a variety of user styles, supports a wider age audience and their ongoing skill development.

02

SITE CONTEXT

UNDERSTANDING SITE CONTEXT

The proposed location sits adjacent to the heavily utilised Bay & Basin Leisure Centre, and is located on a portion of land south of the built form and north east of the existing carpark. The site is surrounded by native bushland that has a number of walking trails, and the Vincentia High School and Public School are both located within a short distance from the proposed development. The proposed site has strong connections with the leisure centre, which will provide a number of ongoing activation opportunities for the facility, with the adjacent carpark providing opportunities for end users to travel to the facility via vehicle.

The development of the proposed skate park and broader precinct provides an opportunity for the Shoalhaven City Council to provide active recreation infrastructure that will become a key community asset and be a contemporary skate park that meets current industry trends. The space will be available to all demographics and provides opportunity to lift the public profile of the youth within the Vincentia and broader Shoalhaven community.

With the existing site features, the facility will create a dynamic and activated youth space with connections to the natural landscape setting offering recreational and social experiences for all members of the community to enjoy.

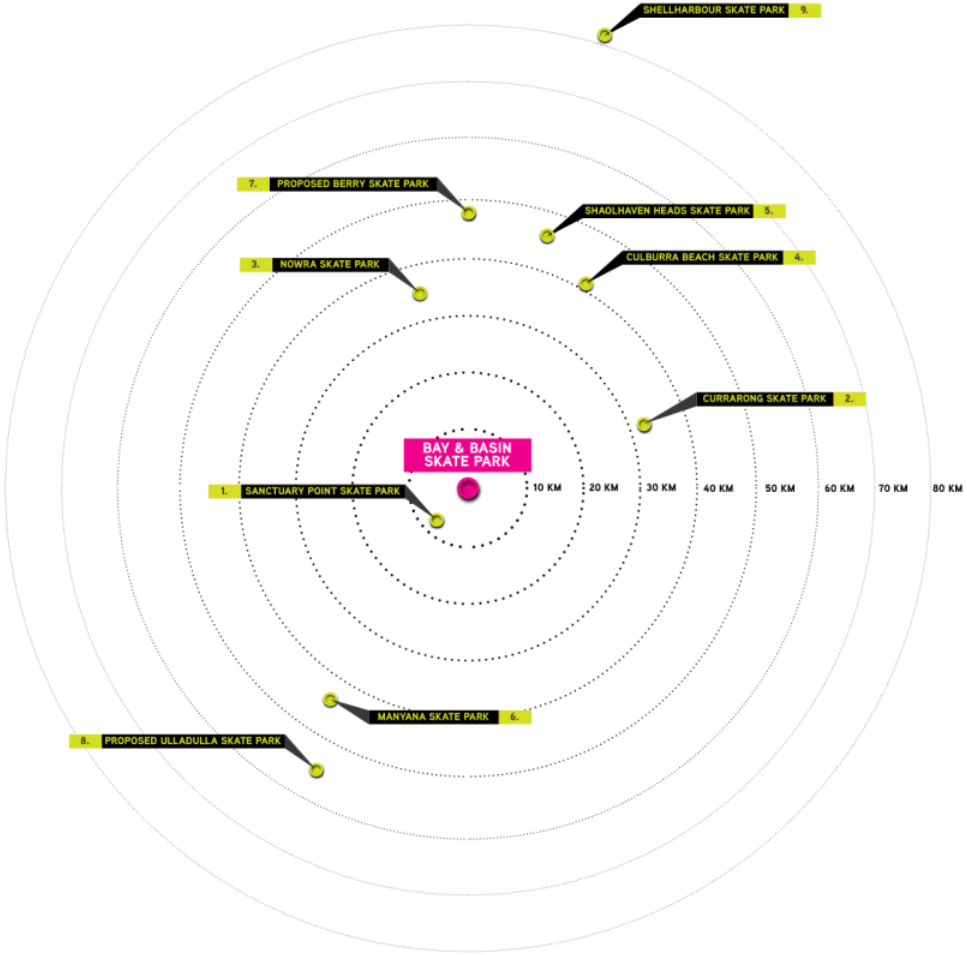
03

UNDERSTANDING SKATE CONTEXT

EXISTING SKATE NETWORK

Shoalhaven City Council have recently started the process of developing a number of sites into new or refurbished skate facilities. When completed, these facilities will provide the community with a number of world class and contemporary skate parks. This will result in the skate and alternative active recreation scene being highly sought after within the Shoalhaven City municipality, and the greater New South Wales region.

As a result of this desktop study a design can be developed for the Bay and Basin Skate Park that further enriches the existing skate space infrastructure within the region and provide a network of facilities that offer end users a variety of skate park typologies and features.



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Many of the existing parks are combination style skateparks offering their users a mix of different skate styles and skill levels. A small number of the existing facilities are old-style skateparks that consist of features that are outdated and not meeting current skate trends. It should be noted that within the past 12 months, two new facilities have been proposed including the Ulladulla Skate Park and Berry/Boongaree Skate Park.

With this in mind it is advised that a flowy combination style facility will be best suited for the new Bay & Basin Skate Park. Flow and street areas will provide a range of features for all rider styles and abilities. These features will have a preference to beginner and intermediate level riders but also include elements that can be used differently by the more experienced. This will create a facility that enables skill development and compliments the ever growing network of skate parks within the Shoalhaven municipality and broader region.


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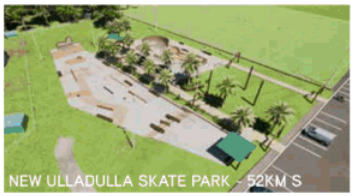
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04

CONSULTATION APPROACH

APPROACH

The consultation process is an integral component of the development of youth spaces and skate facilities. In order to ensure the success and longevity of these key community assets it is crucial to engage with the future users of the space.

Due to the current social environment and social distancing practices Convic adapted their typical face-to-face community workshops to occur through an online platform as outlined below.

The pre design community consultation ran for three weeks from the 20th July to 9th August. It comprised of a video designed to educate and inspire the community on possible inclusions for the new facility and provide insight into the project parameters, opportunities and constraints. This was followed by an online questionnaire that allowed the community to provide feedback for the facility based on the information outlined in the video.

The community consultation aimed to:

- Engage with community members and key stakeholders before the design of the new skate space building excitement for the project.
- Inform participants of key design considerations of the project to build an understanding of the possibilities and restrictions.
- Inspire participants through past project examples illustrating the nature of contemporary skate parks with a variety of integrated, broader community usage options. To show not just skater only facilities, but to include a variety of elements such as, social gathering spaces, sculptural elements and other additional recreational opportunities, as well as illustrating the potential for activation and other community events.
- Gather user information and build user profiles.
- Gather community input into what they think the new facility should be.
- Have community and users take ownership of the consultation process outcomes.

A summary of the pre design community feedback has been included within the community design vision included in the following pages.

The draft concept design consultation saw a fly-through video produced, which discussed in detail the various elements of the recreation facility. Participants were then directed to an online questionnaire, where they were asked in detail about their thoughts on the design.

The draft concept design consultation process aimed to:

- Engage with community members and key stakeholders before the final concept design of the new skate space.
- Inform stakeholders and community members of the current status of the project.
- Have community and users take ownership of the consultation process outcomes.

A summary of the information provided by the end users has been included in draft concept consultation feedback pages of this report.

PROMOTIONAL SCOPE

The consultation aims to increase community awareness of the Bay & Basin Skate Park project and to do so in an open, public and transparent process. The online advertising campaign included the sharing of the digital flyer on Convic's social media pages, through local business's and contacts and Councils social media networks.

Pre-Design Consultation flyer

COMMUNITY DESIGN VISION

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DRAFT CONCEPT COMMUNITY FEEDBACK

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DRAFT CONCEPT CONSULTATION SUMMARY

OPEN BOWL AREA
Many participants favoured this clean and open bowl design and how it provided opportunity for interaction with surrounding elements of the design. Some responses called for some more advanced features within the design/ bowl so we have included an additional extension to provide more provision for those at an advanced level of riding.

STREET AREA
The street area positioned at the higher end of the site was very popular with a number of respondents, and many called for it to be extended and enhanced. This area has been adapted to provide more street features. Several participants also requested the inclusion of a stair set which has been included in the final concept design.

FLOW AREA
The flow area positioned in the middle of the design included a level change with china bank and a number of extensions and transition features. This was generally popular with participants and feedback on how it flowed and functioned was good. However, with the extension and enhancement of the street area/ features we have developed this area to better connect with the new street additions.

OVERALL SKATE AREA
The overall design of the skate space was very well received by the participants of the consultation and the main feedback centred around increasing the street provision and providing some more features to allow progression and appeal to those already at an advanced level of riding. This has been addressed in the final concept design therefore enhancing the capacity and broader appeal of the skate facility. This feedback was supported by Shoalhaven City Council.

SUPPORTING AMENITIES
Respondents requested supporting amenities such as drinking fountains, seating, rubbish bins and shade shelters. A number of participants requested additional shade opportunities and a secondary shelter has been included in the design as a provisional item. The suggested wider concept design for future works was well supported by community who felt it could be built on to further support the skate park and make best use of the site. This should be considered by Council should funds become available.

05

DESIGN IDEATION

CONCEPT IDEATION

The draft concept design is inspired by the iconic coastal location of Vincentia and the nearby picturesque sandy shores that surround it.

Situated on the same site as the Bay & Basin Leisure Centre it is key for the design of the skate park to complement the design language of the leisure centre and form part of a holistic precinct, helping to develop a larger more inviting community asset.

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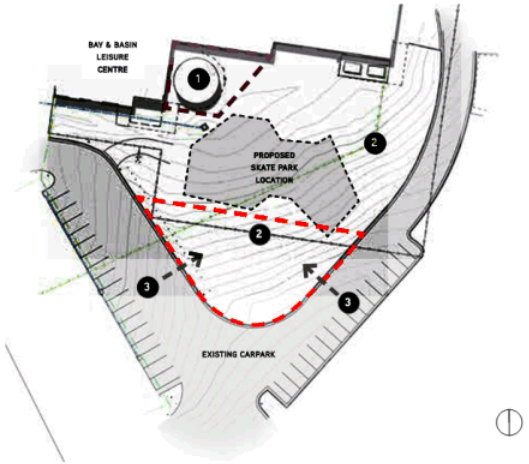

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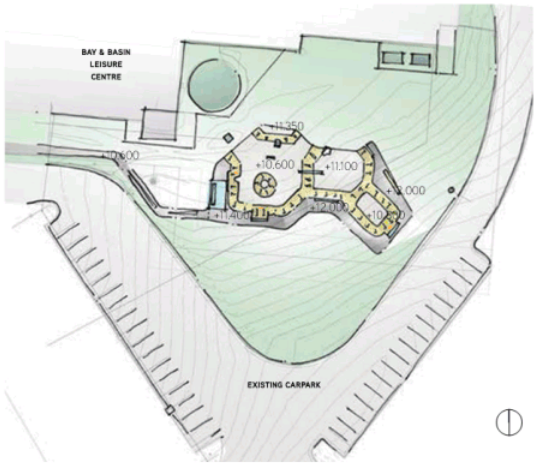
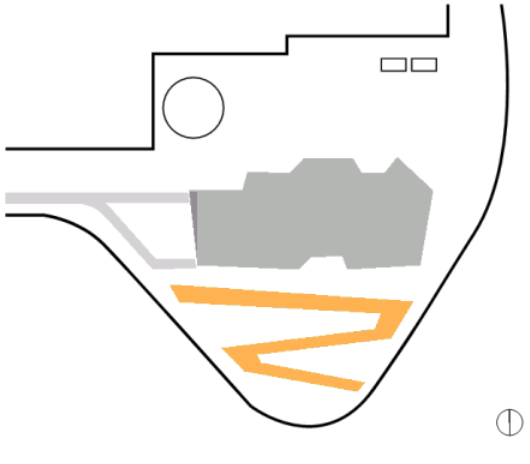


SKETCH DESIGN

The sketch design for the Bay and Basin Skate Park is a flowy transition style park that responds to the feedback obtained from the community during the pre-design consultation events. The skate features are tailored towards beginner and intermediate skill levels with some features included that provide the ability for more advanced riders to enjoy the park too.

The design responds to the site conditions by centrally locating the facility within the site offset from the back of the leisure centre and away from existing underground services while providing enhanced pedestrian access into and around the facility.

The materials and colour palette are inspired by the existing Leisure Centre and costal location to create visual links and form an integrated recreation precinct.



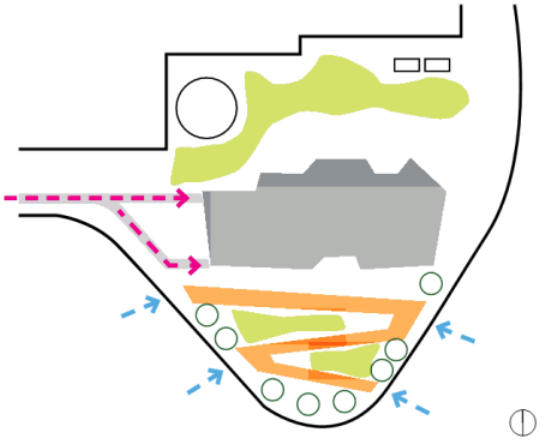
DRAFT CONCEPT DESIGN

The development of the draft concept design has improved pedestrian circulation through and around the site with more resolution provided to areas for spectators and the way that non active users will interact with the facility. Passive and landscape features populate the south area of the site that is not suitable for the skate park development.

The facility design has been rationalised to further enhance natural surveillance into the site with adjustments made to the location of the mini bowl that integrates better with existing levels and underground service locations.

Further development of the edge conditions has been investigated to prevent vehicle access into the park and better refine the edge between the vehicle and pedestrian zones.

CONCEPTUAL DIAGRAMS

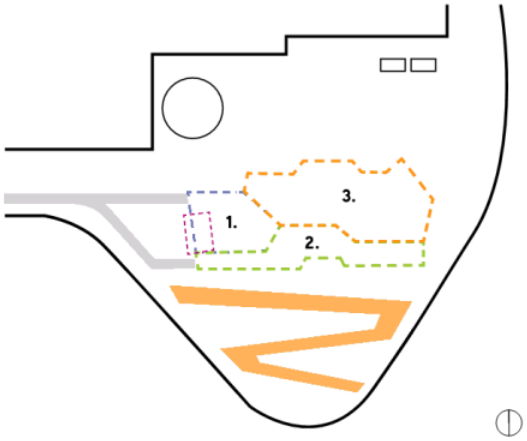


MULTIPLE POINTS OF ACCESS

Multiple informal access points compliment the primary connection points and encourage passive uses and spectators into the space.

The primary access points provide direct connections to the leisure centre and the existing path network. Whilst the more informal access points allow passive uses to easily access the soft spaces and utilise the seating and viewing areas.

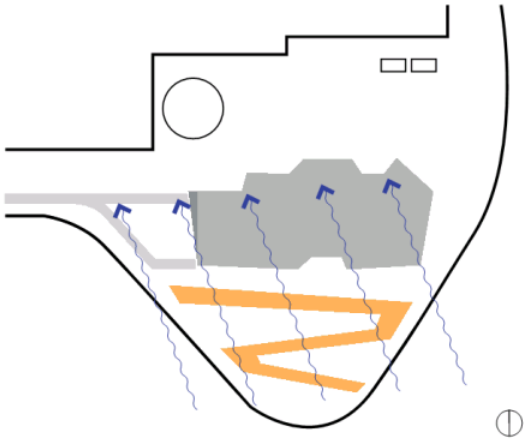
Areas of sturdy planting and trees direct user movements and circulation between active and passive areas and away from back of house areas within the site as well as providing a buffer between the site and car park.



INDIVIDUAL AREAS OF SKATE

The draft design concept offers a number of different skate styles with a preference toward flowy transition with the inclusion of a mini bowl to reflect the pre-design community consultation findings.

The skate park can be used as one larger open skate area on quieter days or as 3 key individual areas on busier days to accommodate a range of user abilities and style preferences.



TIERED SKATE DESIGN

A tiered skate design utilises the natural fall of the site and promotes key sight lines from the car park, surrounding pathways and spectator spaces positioned higher up the site.

Within the skate park the mini bowl sits higher up the site to minimise the need for earth batters on the southern side and maximise passive surveillance.

DRAFT TO FINAL : KEY CHANGES

DRAFT

FINAL

1. Mini bowl area increased and corner extension added to provide additional advanced level features.
2. Additional ledge added to street area.
3. Street area increased and features varied to broaden appeal and increase capacity.
4. Stairs set added to central flow area.
5. 'China Bank' adjusted to better complement new stair set addition and allow potential fly out options.
6. Two bins and drinks fountain near to entrance and shelter areas proposed as provisional items for future works.
7. Secondary shelter proposed as provisional item for future works.

FINAL CONCEPT : CAD SKETCH

LEGEND

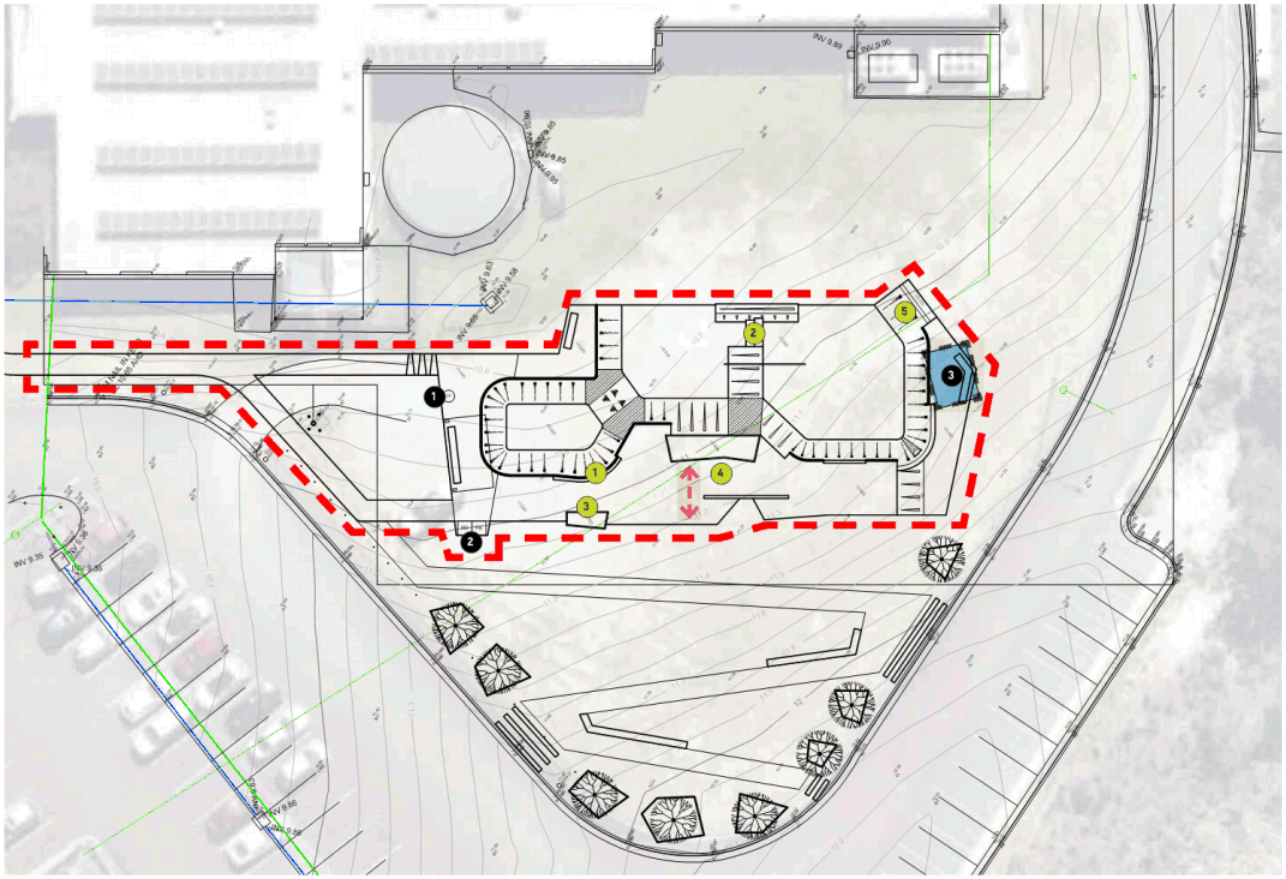
KEY CHANGES

1. Extension added to bowl to provide more advanced feature.
2. China bank Hubba + Stair Set added to increase street provision.
3. Additional Street Ledge added to increase street area and features.
4. Ledge adjusted and Street Area increased.
5. Quarter Pipe and Coping modified to provide more advanced features.

Extent of current works.

PROVISIONAL/ FUTURE WORKS.

1. Drinks Fountain provided.
2. Two Bins and concrete pad added.
3. Additional secondary Shade Shelter.



CLIENT:	DESIGNER:	SCALE: 1:300 @ A3	PROJECT:	TITLE:	DATE:	REVISION:
Shoalhaven City Council	CONVIC	0m 3m 15m / 1.5m 7.5m 30m	BAY & BASIN SKATE PARK	FINAL CONCEPT CAD SKETCH PLAN	16.12.2020	A

SA21.9 - Attachment 3

FINAL CONCEPT PLAN

LEGEND

SKATE WORKS

1. 1000H Quarter Pipe
2. Quarter Pipe Hips
3. 350H Mogul
4. 1000H Mini Bowl
5. 1400H Escalating Corner Extension
6. 350H Ledge + Slider Rail
7. Bank to Ledge + Manny Pad
8. 'China' Bank Hubba Ledge
9. Stair Set
10. Down and Out Rail
11. Flat Bank Hip blend
12. 600H Whippy Quarter to Kerb
13. 1500H Quarter Pipe Extension
14. 900H Quarter Pipe
15. 1200 High Corner Extension
16. 800H Love Seat
17. 300H Flat Bank

SUPPORTING AMENITY

1. Drinks Fountain (provisional)
2. Shade Shelter
3. Concrete Seating
4. Bins (provisional)

PROPOSED FUTURE WORKS

1. Secondary Shade Shelter
2. Meandering Footpath
3. Robust Planting
4. Spectator Seating
5. Informal Connection Paths
6. Shade/ Boundary Trees

CLIENT:	DESIGNER:	SCALE: 1:300 @ A3	PROJECT:	TITLE:	DATE:	REVISION:
Shoalhaven City Council	CONVIC	0m 3m 15m / 1.5m 7.5m 30m	BAY & BASIN SKATE PARK	FINAL CONCEPT LAYOUT PLAN	16.12.2020	A

SA21.9 - Attachment 3

FINAL CONCEPT

PERSPECTIVE - 01

FINAL CONCEPT

PERSPECTIVE - 02

FINAL CONCEPT

STREET SECTION PERSPECTIVE - 03

FINAL CONCEPT

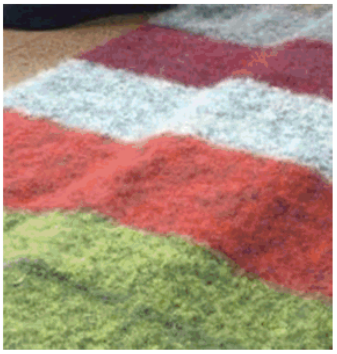
PERSPECTIVE - 04

07

CONCLUSION

MOVING FORWARD

It is anticipated that the final concept design will be discussed at the council meeting on the 19th of January 2021. Upon approval and endorsement of the final concept design by the Shoalhaven City Council, the project will progress into the following detailed design phases. The detailed design of the facility will continue to develop the skate facility within project parameters while maintaining a truly relevant design reflecting community needs, user requirements and the overall project vision.


Shoalhaven City Council

Berry Spinners & Weavers Inc. Workshop Outcomes Report

December 2020

Cover Photographs - Source: Berry Spinners & Weavers Inc. Facebook Page

localé consulting

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Client: Shoalhaven City Council
Job Contact: Trevor Cronk – Manager Property Unit
Document Name: Outcomes Report

Version	Date	Authors	Reviewer / Approved
Draft	10.11.2020	Cinnamon Dunsford	Steve Thompson
Draft V2	11.11.2020	Cinnamon Dunsford	Steve Thompson
Final V1	03.12.2020	Cinnamon Dunsford	Steve Thompson

Contents

1. Introduction

1.1 Workshop Background

This report relates to the workshop held on 22 October 2020 to discuss the requirements of new premises for the Berry Spinners & Weavers Inc. community group (**BSW**). The workshop was held from 12noon –1:30pm with a mix of Council staff, Councillors and external stakeholders. A follow up meeting was held with Council staff, Councillor and external stakeholders on 2 December 2020. The workshop and follow up meeting attendees are listed below.

Date:	22 October 2020	2 December 2020
External stakeholders (from the BSW):	Kate Downes	Kate Downes
	Rosalie Andrew	Rosalie Andrew
Council staff:	Trevor Cronk	Trevor Cronk
	Donna Sullivan	Susan Edwards
		Jessica Volkanovski
Councillors:	Greg Watson	Greg Watson
	John Wells	John Wells
	Patricia White	Patricia White
		Nina Digiglio
Facilitator (Locale Consulting):	Cinnamon Dunsford	Cinnamon Dunsford

Noelene Cox from the BSW was an apology and was provided an opportunity to email or phone the facilitator after the workshop was held.

1.2 Workshop Structure

This section provides an overview of the workshop process. An agenda of the workshop is provided in Appendix A. At the workshop participants were given the agenda and the list of requirements for new premises that had previously been discussed with the BSW and Council staff.

From the outset, the key aim of the workshop was highlighted to participants. This was to discuss and determine the storage, layout, configuration, space, access and other design requirements of new premises for the BSW.

Following introductions and an outline of the process, the workshop was divided into two key parts:

1. Round table discussion and review of the list of requirements for new premises
2. Next steps in the process of relocating the BSW

The key feedback received at the workshop, overall workshop outcomes and next steps are provided in Section 2 of this report.

2. Workshop Feedback

This section provides a summary of the feedback from the workshop. The intent of this summary is to assist Council and the BSW to collaboratively move forward with establishing new premises, on the agreed basis of the requirements of those premises.

2.1 The Community Group

The BSW are a member of the Hand Weavers and Spinners Guild of NSW (**the guild**), which is a not for profit organisation with a single objective:

"... to bring together, for their mutual benefit, people who practise any of the arts of hand weaving, spinning and associated crafts; to foster and encourage the crafts by instruction, discussion and exhibition of work ..."

The BSW are a long-standing community group in Berry who were using the premises at the Rural Youth Hall, in the Berry Showground for 29 years (until early 2019) and recently celebrated their 40th birthday.

The BSW have 70+ members but advised membership has diminished in more recent times due to:

- Lack of permanent premises
- Loss of older participants
- COVID

However, they do have enquiries from families in the Berry area, have held successful school holiday programs and with new permanent premises envisage they could create a hub of artistic creativity in Berry. As the lead tenant of any new premises, they see the potential to co-locate with other local community groups such as patch workers, knitters, brush painters, embroiders and the scrabble club.

2.2 Space, Layout & Configuration Requirements

The minimum building area was discussed and agreed to be approximately 240m^2. However, it was agreed that the building should take the form of either a project home or modular form, that can allow for future expansion, for both the BSW and other community groups.

It was felt a 'project home' shell, with no internal walls, would allow a fit-out to suit community use purposes, whilst also having a more residential and less industrial appearance. A modular building would also allow for dual/ multi use of the building with foldable doors to change space composition to suit smaller and larger community groups. Either option would also enable the layout and configuration to be changed to suit the different activities undertaken by the BSW ranging from smaller meetings to large workshops and exhibitions. Council has previously developed 'project home' style community buildings with flexible floor plans at the corner of Holloway and Park Roads, Nowra and 78 St Vincent Street, Ulladulla.

It was also agreed that outdoor space for a garden and landscaping would be beneficial to allow the BSW to grow plants such as indigo and flax for use in their activities and also to allow drying space for large fleeces and the like.

The building and outdoor space would allow for the following activities, and other related activities, to be undertaken by the BSW:

- Fleece preparation
- Fibre preparation
- Loom and spinning wheel use
- Basket weaving
- Dying
- Felting
- Exhibitions
- Workshops and friendship days with other guild groups, schools etc.

The detailed list of requirements as agreed at the workshop is included in Appendix B.

2.3 Items & Storage

The BSW (and similar that are associated with the guild) are comparable to those organisations associated with the Australian Men's Shed Association. This is because they have several large, permanent machines/ equipment that are not able to be set up then packed up and removed from a community building before and after each use of the space. This is a key reason that other existing community spaces within Berry do not meet the practical needs of the BSW, including their temporary use of the Berry School of Arts building. This equipment includes two large looms, with space for a third loom and other associated equipment being preferable (it is noted this has been included in the overall building space requirement in Section 2.2 above).

Other items that the BSW use and would potentially leave at a new premises include:

- Private, portable looms
- Spinning wheels
- Large drying racks
- Dying equipment
- Tables and chairs
- Other associated equipment

Smaller areas of lockable space (such as cupboards and shelving) would also be required for books and other storage.

2.4 Case Study

The recently constructed Club Room at the Nowra Aquatic Park was discussed as a possible modular style building that could suit the BSW. As an outcome of the workshop, the representatives from the BSW were provided with contact details of the Council staff that could organise a site inspection for the BSW.

At the follow up meeting held on 2 December 2020 Kate and Rosalie from the BSW advised they had visited the Club Room at the Nowra Aquatic Park, since the workshop on 22 October 2020 was held. They raised concerns with the low ceiling height, lack of light/ windows and lack of verandah. They felt their new premises would require higher ceilings (minimum 3.3m high), large windows, skylights and sufficient, covered outdoor areas. This could be addressed via a 'project home' style option for new premises.

2.5 The Potential Site

Prior to the workshop the facilitator was advised by Council staff that the site of the new premises was likely to be Council owned land, located between Station Street and the railway line, to the immediate south of Berry Showground. This was the preference based on a working group, internal site selection process and due diligence assessment undertaken by Council's Property Unit. This land (Lot 3 DP 840080) is classified as "operational" land and is zoned RE1 Public Recreation. The proposed premises (as discussed at the workshop) would be considered a permissible land use in this zone. Key issues for consideration in the planning approvals process include flooding, heritage considerations, acoustics, vibration, how parking and co-location with other user groups will be addressed.

The Berry Showground Plan of Management and associated Master Plan is currently being prepared by Council. It is noted the Plan of Management will only apply to the land classified as "community" land (not Lot 3 DP 840080), however the associated Master Plan will include the proposed site and as such the requirements of the new BSW premises should be considered and referenced in the Master Plan.

2.6 Engagement

As stated in Section 2.5 above, Council is currently preparing the Berry Showground Plan of Management and associated Master Plan. It is in the very early stages, with the initial consultation stage closing in mid October 2020.

Although the Plan of Management will not apply to the potential site for the new BSW premises the Master Plan will. It is therefore very timely and important that the BSW formally engage in this process and undertake consultation with other key stakeholders, including the Berry Show Committee.

This will ensure space allocation on the potential site (Lot 3 DP 840080), where there is ample room for the 240m^2 building (including room for expansion and associated outdoor space/ landscaping). This site would also allow for overflow parking on a small number of days each year when large events are held at the showground (subject to COVID restrictions).

3. Key Outcomes & Directions

The following key outcomes and directions were identified at the workshop:

- The BSW visit the Nowra Aquatic Park Club Room as an example of a possible modular building that may suit their needs.
- The BSW formally engage in the Berry Showground Master Plan process, so space allocation, and collaboration between all user groups at the potential site of the new premises can occur.
- Council staff report the matter to a Council meeting to obtain endorsement for the working group's preferred site (Lot 3 DP 840080) and initial budget to enable planning approval to be obtained. This will allow site confirmation and subsequent planning approval to occur.
- Concurrently with site confirmation, Council's asset strategic planner team undertakes a formal DAU meeting with Council's development assessment team and obtains plans for the 'project style' home with flexible floor plan or modular building (based on needs identified at Appendix B). This will enable the planning approvals process to commence (to ensure the project is 'shovel ready' and costed to enable funding opportunities to be pursued). The DAU meeting and subsequent DA process are likely to address acoustics, vibration, heritage assessment, flooding (which it is noted has been impacted at the preferred site by the construction of the Berry Bypass and will require reference to the RMS Flood Study for that project), car parking, access and the like.

Appendix A – **WORKSHOP AGENDA**

Agenda/ Running Sheet – Berry Spinners & Weavers Inc. - New Premises Requirements

Shoalhaven City Council, Nowra Administration Building, Jervis Bay Meeting Rooms
Thursday, 22 October 2020
12noon – 1:30pm

Time	Item
12noon	Introductions & registration of attendance
12:10pm	Locale states aim of the meeting: *Aim is to discuss and determine the items & storage, layout, configuration, space, access and other design requirements of new premises for Berry Spinners & Weavers Inc.*
12:15pm	Round table / whole group discussion of following requirements: ○ Items & Storage ○ Layout ○ Configuration ○ Overall Space/ Area ○ Times of use/ access ○ Other Design *Start point will be previous requirements provided by the Berry Spinners & Weavers Inc. (displayed on screen at meeting or printed for participants)*
1pm	Locale provides summary of round table/ whole group discussion
1:15pm	Whole group agreement to next steps, including "Outcomes Report" to be prepared by Locale
1:30pm	Close

Appendix B – **LIST OF REQUIREMENTS FOR NEW PREMISES**

List of Requirements for New Premises – Berry Spinners & Weavers Inc.

1. Open meeting/work room of approx. 100 sqm with high ceilings (for spinning wheels and looms)
2. Separate exhibition and demonstration space of approx. 50 sqm
3. Storage area of approx. 20 sqm, lockable (including cupboards, shelving)
4. Library area of approx. 10 sqm, lockable
5. Hostess kitchen facilities
6. Large internal laundry/wet area
7. Easy access toilets to meet BCA requirements
8. Adequate outdoor area, under roof line with cover
9. Windows for natural lighting & artificial lighting
10. Efficient insulation
11. Sound proofing – between rooms & entire building
12. Reverse cycle A/C
13. Heavy duty flooring – industrial vinyl curved up the walls or similar (no carpet)
14. Wide entrance doors (for large portable looms and spinning wheels)
15. Disabled access
16. Power (integrated sound / presentation system and hearing loop)
17. Water
18. Wet area with chemical storage
19. Security system

It is noted Items 1 - 8 above total approx. 240m^2, excluding the garden/ landscaped area.

REVIEW OF ENVIRONMENTAL FACTORS (REF)
SHOALWATER INFRASTRUCTURE – MOSS VALE RD URAs
PART 2: SEWER INFRASTRUCTURE

Contents

1. PROPOSAL AND LOCATION

1.1 Proposed activity

Shoalhaven Water is currently planning and undertaking the development of water and sewerage infrastructure to service and facilitate development of the Moss Vale Rd Urban Release Areas (URAs).

Review of Environmental Factors (REF) Shoalwater Infrastructure – Moss Vale Rd URAs Part 1: Moss Vale Rd Water Lead-in (Council reference D20/402515) provided environmental assessment for the construction of a water main from Cambewarra, running approximately 1.575km eastward along Main Rd and the south-east along Moss Vale Rd, as a water lead-in, to service the Moss Vale Rd Urban Release Areas (URAs).

The subject of the current report is the proposed construction of sewage infrastructure to service the Moss Vale Rd Urban Release Areas (URAs). Sewer Rising Mains, Gravity Mains and two Sewer Pumping Stations (SPSs) would be constructed to deliver sewage from the Moss Vale URAs to the Bomaderry Sewage Treatment Plant (STP). Additionally, a new SPS (named New SPS21) would be constructed in North Nowra, adjacent to the future Far North Collector Rd, and the existing SPS21 (located on Illaroo Rd) would be decommissioned.

The key components of the proposal include (adapted from Cardno 2020):

- 2022 - Construction of the MVRS SPS (located in Lot 262 DP 794245 on Far North Collector Rd approx. 480m west of Moss Vale Rd), with the following features:
    - Access from the Far North Collector/Taylors Lane Roundabout
    - Site approx. 60x40m with level to be built up to exceed flood occurrence requirements
    - An all-weather access track
    - 1.8m high fence around the site
    - Concrete wet well, concrete valve pit and concrete flow meter chamber
    - Underground concrete emergency storage tank, with an overflow discharge to vegetated swale (directed to Bomaderry Creek)
    - 2 x 10kL Chemical dosing tanks to be provided within a concrete bunded area
    - Electrical cabinet, 300mm above the flood level with Electrical supply from Moss Vale Road
    - Emergency generator
    - Potable Water Supply from Moss Vale Road
- 2022 - Installation of 1.3 km of rising main from MVRS to MVRN SPS site. Potential to inject into the terminal rising main, allowing MVRN SPS to be staged, but should be further reviewed in Concept Design, when development timings are better understood.
- 2022 - Installation of 2.7 km of DN525 rising main to SPS08. Dual DN375 mains could potentially be installed to provide better interim performance and minimise retention times.
- 2022 – installation of 1.6 km of DN675 main from SPS08 to the Bomaderry WWTP

- 2022 – Divert North Nowra flows via a DN300 gravity line that utilises the Far North Collector Bridge across Bomaderry creek.
- 2022/2023 – Construction of the New MVRN SPS (located in Lot 2 DP1134376, along Abernethys Lane, approximately 350m west of the Bells Lane and Abernethys Lane intersection), with the following features:
    - Site approx. 60x40m
    - An all-weather access track from the intersection of Bells Lane and Abernethys Lane to the SPS site along the road reserve. Culvert bridging of watercourse required.
    - 1.8m high fence around the site
    - Concrete wet well, concrete valve pit and concrete flow meter chamber
    - Underground concrete emergency storage tank, with an overflow discharge to a vegetated swale (directed to Abernethys Creek)
    - 2 x 10kL Chemical dosing tanks to be provided within a concrete bunded area
    - Electrical cabinet, 300mm above the flood level with Electrical supply from Bells Lane
    - Emergency generator
    - Potable Water Supply from Bells Lane
- 2022/2023 – Connection of Cambewarra rising main (SPS23) into the MVRN gravity system
- Construction of New SPS21 (located in Lot 1 DP848630 adjacent to the future Far North Collector Rd near the intersection with Illaroo Rd) with the following features:
    - All weather access track into the site from Illaroo Road
    - Concrete slab adjacent to the wet well
    - 1.8m high fence around the site
    - Concrete wet well, concrete valve pit and concrete flow meter chamber
    - Underground concrete emergency storage tank, with an overflow discharge to a vegetated swale (directed to Bomaderry Creek)
    - Electrical cabinet, with Electrical supply from Illaroo Road
    - Emergency generator
    - Potable Water Supply from Illaroo Road
- 5m wide easements shall be established where required. A 20m construction corridor would generally be provided
- Excavation for the installation of pipes would generally be in the form of trenching. Underboring (micro tunnel or horizontal directional drilling (HDD)) would be applied where the crossing of creeks, roads and the railway line is required, and would comply with relevant authority approvals
- Clearing of vegetation would be minimal – the proposal has been designed to align with existing and future road easements and existing cleared corridors to every practical extent to minimise the potential for impact to native vegetation and habitat;

Further details of the proposal including layout plans with longitudinal sections are provided in Cardno 2020 (see Appendix A, D20/450654)

Shoalhaven City Council (SCC) is the proponent and the determining authority under Part 5 of the EP&A Act. The environmental assessment of the proposed activity and associated environmental impacts has been undertaken in the context of Clause 228 of the *Environmental Planning and Assessment Regulation 2000*. In doing so, this Review of Environmental Factors (REF) helps to fulfil the requirements of Section 5.5 of the Act that SCC examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

1.2 Location

The proposed activity would be undertaken within Council owned land, road reserves and easements to be established over privately owned lots, from the future Far North Collector Rd, northward along Bells Lane, westward along part of Abernethys Lane and through Council, RMS and private land to the railway line, before running south adjacent to Railway St to the Bomaderry STP. The New SPS21 would be constructed adjacent to the future Far North Collector Rd near the Illaroo Rd intersection, with gravity mains running along Illaroo Rd to the connection point of the old SPS21 and rising mains from the New SPS21 running north to connect with existing gravity mains (refer to Figures 1, 2, 3 and 4). Details of affected property is presented in Table 1.

Table 1. Affected property

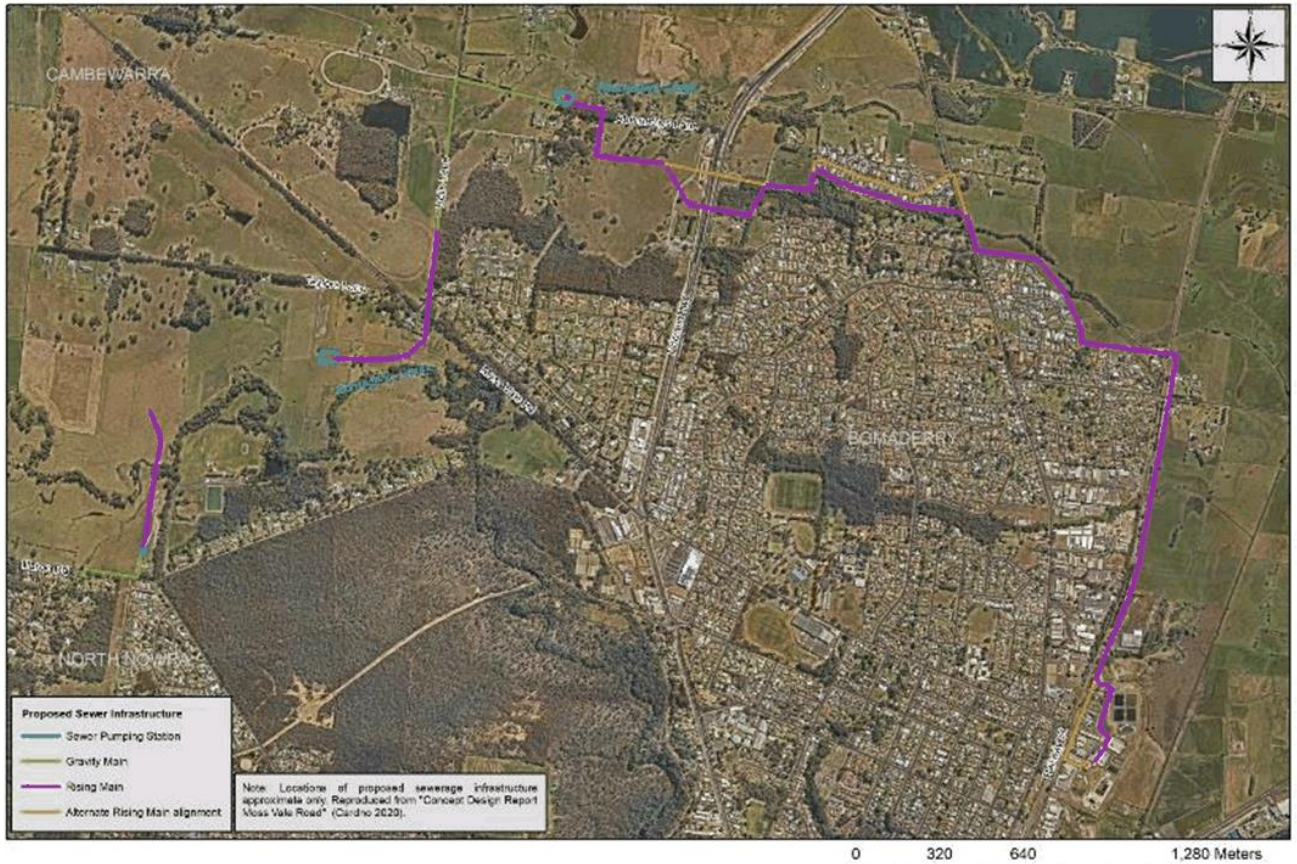
Lot / DP	Owner / Land Manager	Comments
Lot 262 DP 794245	SCC	Freehold Council operational land
Lot 4 DP 268209	Private	Creation of a services easement required
Lot 2 DP 1134376	Private	Land acquisition required for SPS; Creation of a services easement required
Lot 1 DP 1134376	Private	Creation of a services easement required
Lot 601 DP 1223625	Private	Creation of a services easement required
Lot 602 DP 1223625	RMS	Designated road - Creation of a services easement not required
Lot 435 DP 1210528	RMS	Designated road - Creation of a services easement not required
Lot 415 DP 1210528	SCC	Freehold Council community land
Lot 502 DP 1221372	Private	Creation of a services easement required
Lot 73 DP 1047274	SCC	Freehold Council community land
Lot 202 DP 1180659	Private	Existing services easements occur; Creation / modification of a services easement likely required

Lot 1 DP 1164576	SCC	Freehold Council operational land
Lot 13 DP 708513	SCC	Freehold Council operational land
Lot 16 DP 259169	SCC	Freehold Council operational land
Lot 1 DP 572583	SCC	Freehold Council operational land
Lot 1 DP 848630	SCC	Freehold Council operational land
Lot 2 DP 848630	Private	Land acquisition in progress associated with Far North Collector Rd. Sewer infrastructure would be entirely within Council acquired land.
Lot 8 DP 1256748	Private	Land acquisition in progress associated with Far North Collector Rd. Sewer infrastructure would be partially within Council acquired land; Creation of a services easement required
Moss Vale Rd	SCC	Road reserve – rising main would cross beneath Moss Vale Rd via micro tunnel
Bells Lane	SCC	Road reserve
Abernethys Lane	SCC	Road reserve
Princes Hwy	RMS	Road reserve – rising main would cross beneath Princes Hwy via HDD or micro tunnel; Authorisation required
Meroo Rd	SCC	Road reserve
(unnamed road reserve adjacent to railway reserve)	SCC	Road reserve
Railway St	SCC	Road reserve
Illaroo Rd	SCC	Road reserve
DP Ms1611Sy	Railcorp	Railway reserve – rising main would cross beneath railway reserve via HDD under bore; Authorisation required

Shoalhaven City Council

Review of Environmental Factors
Part 5 Assessment EP&A Act 1979

Figure 1. Site location



SA21.11 - Attachment 1

Review of Environmental Factors
Part 5 Assessment EP&A Act 1979

Figure 2. Proposed works showing photo-point locations (north-west portion)

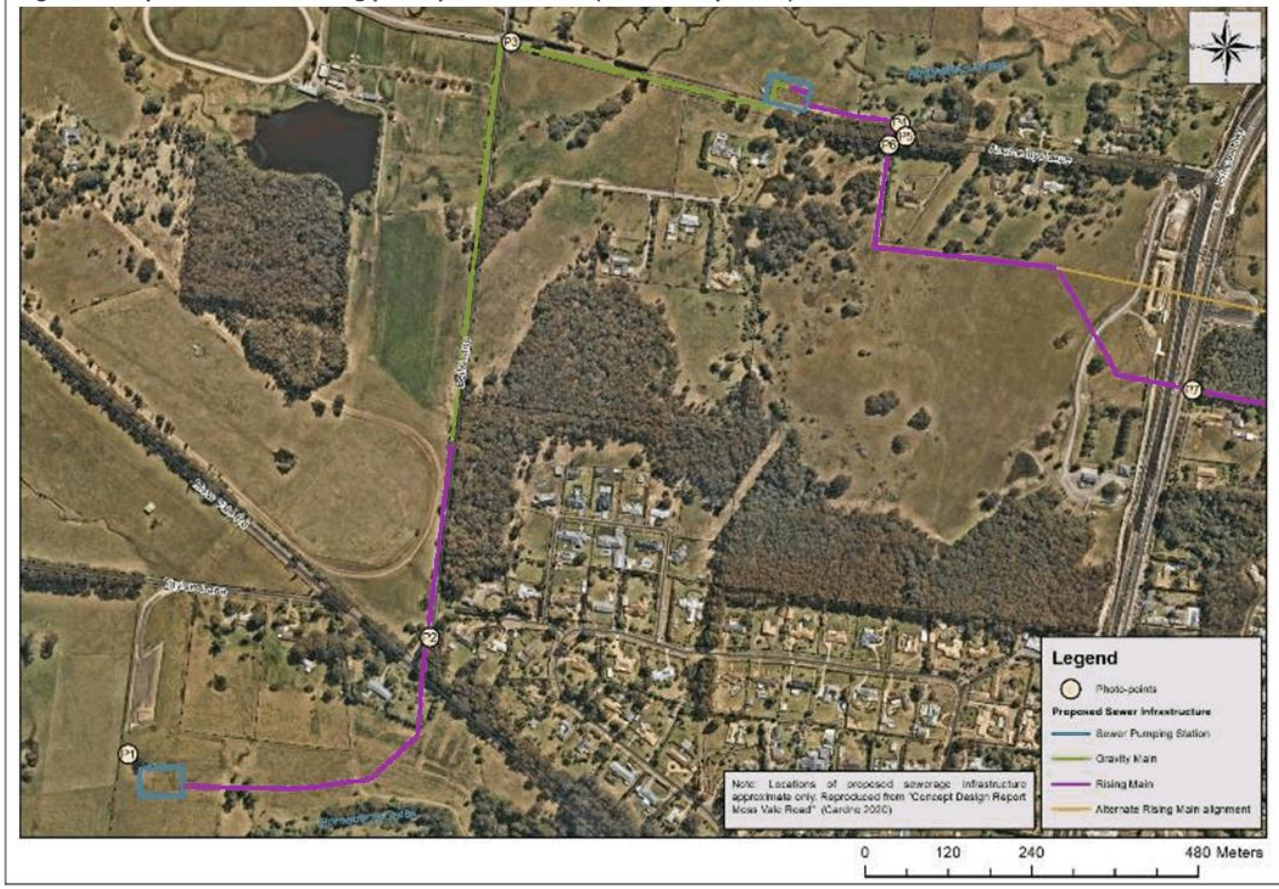
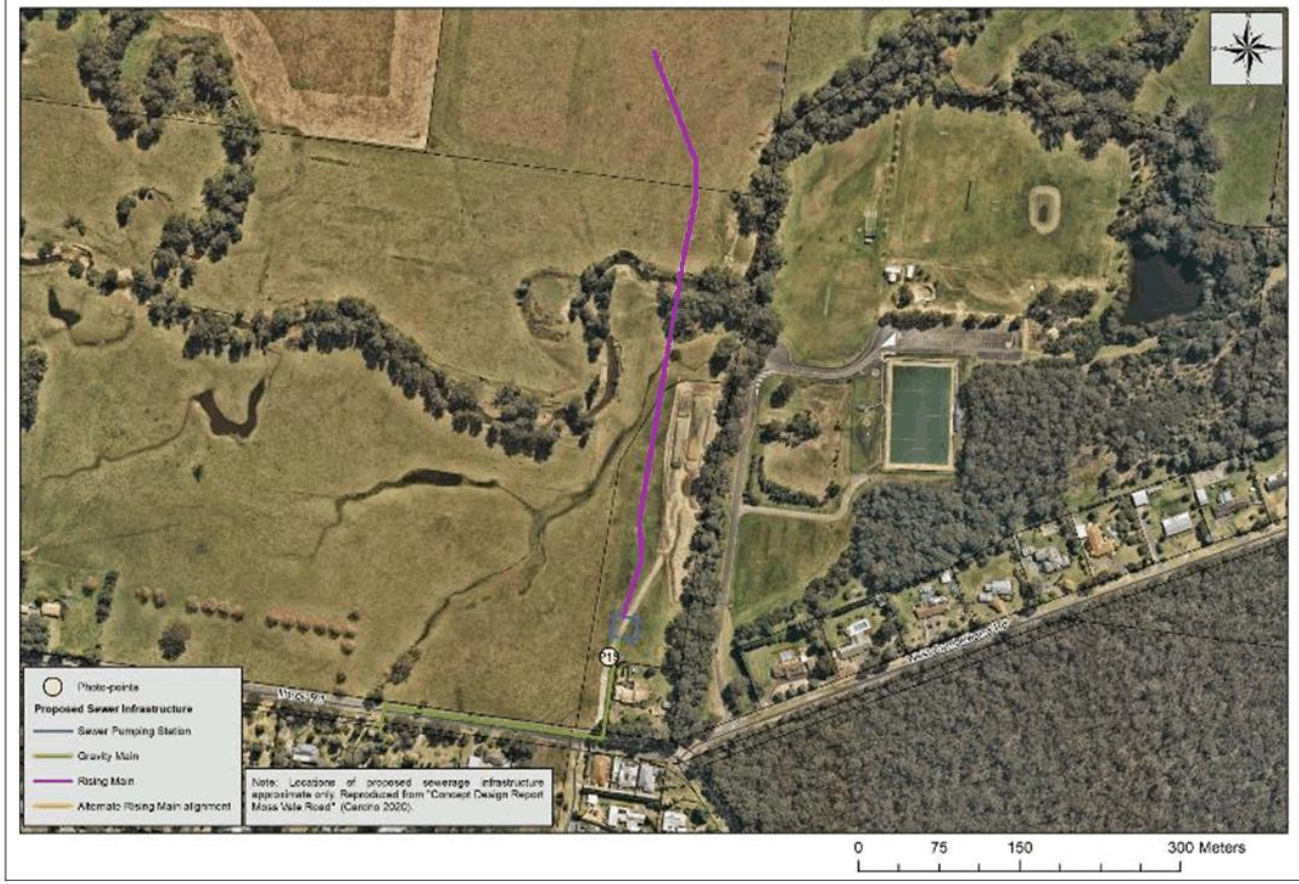


Figure 3. Proposed works showing photo-point locations (east portion)

Figure 4. Proposed works showing photo-point locations (south-west portion – SPS21)



2. EXISTING ENVIRONMENT

2.1 Habitat and vegetation assessment

Site surveys were undertaken by a Council Environmental Officer for the purpose of an environmental constraints assessment (Technical Services, Shoalhaven City Council 2020) to inform a preferred design on 9th and 10th January 2020. Further survey was undertaken on 8th October 2020 focusing on the proposed alignment of the preferred design. The surveys involved vegetation and habitat assessment, recording of all flora species within and immediately adjacent to the subject site, determination of vegetation communities, investigation of fauna signs, and targeted survey for potentially occurring threatened flora species (including *Solanum celatum, Rhodamnia rubescens* and *Hibbertia stricta* subsp. *furcatula*).

Targeted surveys were undertaken in areas of potential habitat for Green and Golden Bell Frog, *Genoplesium baueri, Pterostylis gibbosa* and *Hibertia stricta* subsp. *furcatula*. More detail on targeted surveys is provided below.

The project has been designed to align with existing cleared land and corridors to minimise the impact to native vegetation and habitat. The site is therefore mostly cleared, with cover of exotic grasses (predominantly Kikuyu and Paspalum).

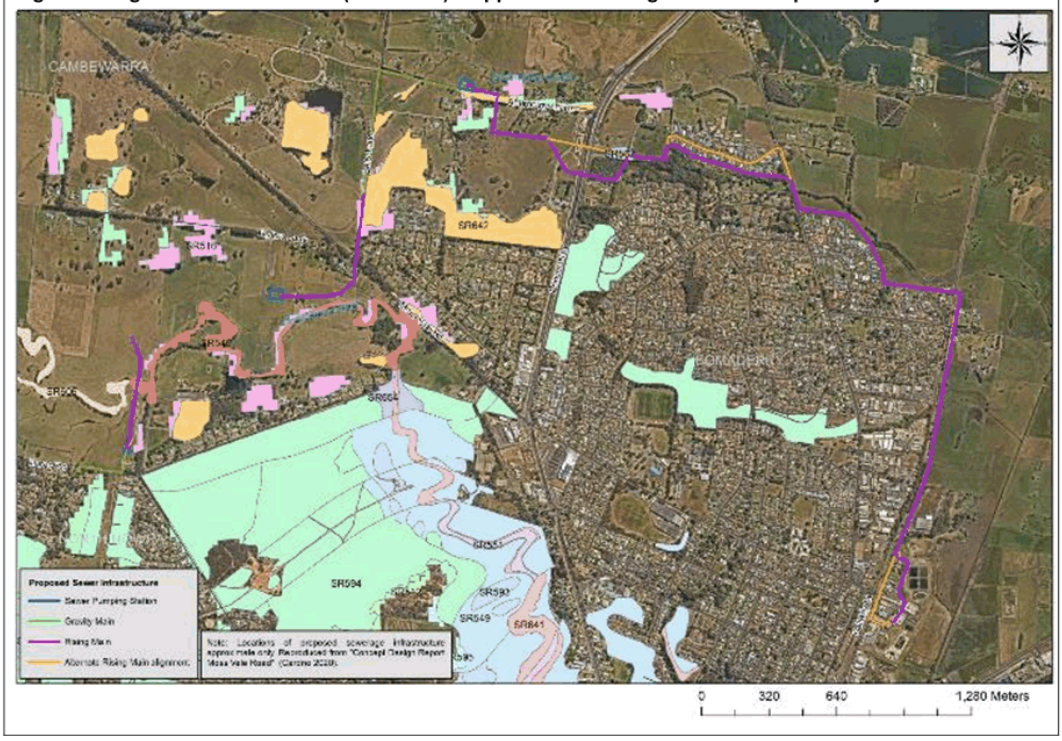
Vegetation communities mapped as occurring within and immediately around the site are shown in Figure 5 and include:

- PCT1212 (Biometric SR642) *Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats, southern Sydney Basin and South East Corner*
- PCT694 (Biometric SR516) *Blackbutt – Turpentine – Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin*
- PCT1082 (Biometric SR594) *Red Bloodwood – Hard-leaved Scribbly Gum – Silvertop Ash heathy open forest on sandstone plateaux of the lower Shoalhaven Valley, Sydney Basin*
- PCT838 (Biometric SR545) *Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin.* This community is associated with *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion* endangered ecological community.
- PCT1105 (Biometric SR606) *River Oak open forest of major streams, Sydney Basin and South East Corner*

Along the northern end of the future Far North Collector Rd (in the vicinity of photo-point P1 – refer also to Photo 1), vegetation is predominantly exotic grassland dominated by Paspalum. Two hollow-bearing trees occur (Spotted Gum and Rough-barked Apple) occur in close proximity to the proposed location of the MVRS SPS. A small patch of *Forest Red Gum – Thin-leaved Stringybark grassy woodland* occurs within a minor, unnamed watercourse to the east. This patch of vegetation is in a degraded condition, being small, open and exposed and containing reduced native species diversity, but is nevertheless regarded as being consistent with *Illawarra Lowlands Grassy Woodland* endangered ecological community. It is comprised of *Eucalyptus tereticornis, E.amplifolia, Angophora floribunda*, *Melaleuca linarifolia* and

M.styphelioides with the ground stratum consistent with the surrounding exotic grassland species composition. The patch is disconnected from the Bomaderry Creek riparian corridor. This watercourse would be under-bored to minimise impacts to vegetation and the waterway.

Figure 5. Vegetation communities (Biometric) mapped as occurring within and in proximity to the site



Between this area and the Bells Lane / Moss Vale Rd intersection, the rising main alignment would pass through an area of exotic ornamental vegetation associated with the residential property at 125 Moss Vale Rd (Lot 262 DP 794245). This planted vegetation includes Silky Oaks, Flame Trees, fruit trees and non-endemic Eucalypt species with an exotic grass (predominantly Kikuyu) understorey (refer to Photo 2, photo-point P2).

Northward along Bells Lane, the rising main and then gravity main alignment would occur on the west side of the road, within predominantly cleared paddocks. Small exotic ornamental trees and shrubs including Photinia and Box Elder (*Acer negundo*) occur scattered along the fenceline (refer to Photo 3, photo-point P2). On the eastern side of Bells Lane occurs patches of *Spotted Gum - Grey Ironbark - Woollybutt grassy open forest* in varying states of integrity. It is not anticipated that this native vegetation will be impacted.

Westward from Bells Lane along an unformed section of Abernethys Lane, a gravity main alignment would follow a corridor of cleared, exotic grassland dominated by Kikuyu grass (refer to Photo 4, photo-point P3). A small patch of native trees (including Spotted Gum *Eucalyptus maculata* and Cheese Tree *Glochidion ferdinandi*) occurs either side of a small unnamed creek

tributary of Abernethys Creek. This watercourse would be under-bored to minimise impacts to vegetation and the waterway.

The proposed MVRN SPS (located in Lot 2 DP1134376, along Abernethys Lane) would occur in a cleared, grassland area (refer to Photo 5, photo-point P4).

The eastern unformed portion of Abernethys Lane supports mature *Spotted Gum - Grey Ironbark - Woollybutt grassy open forest* (refer to Photo 6, photo-point P5). The understorey is somewhat degraded, however, this vegetation contains numerous large, mature Spotted Gum trees with significant hollows. This area is proposed to be under-bored between Lot 1 DP 1134376 and Lot 601 DP 1223625 to avoid impact to the native vegetation and habitat features present.

South and then east from Abernethys Lane, the proposed rising main would occur in cleared exotic grassland, requiring no vegetation removal (refer to Photo 7, photo-point P6).

East of the Princes Highway the proposed rising main would occur primarily within a cleared APZ, and then roughly follow a Shared Users Path through to the southern and eastern boundary of Lot 502 DP 1221372 (refer to Photo 8, photo-point P7; Photo 9, photo-point P8; Photo 10, photo-point P9; and Photo 11, photo-point P9). In this area, minor clearing of disturbed native understorey vegetation (including *Acacia filicifolia, A.suaveolens, A.binervata, A.floribunda, Pittosporum undulatum, Breynia oblongifolia* and *Kunzea ambigua*) and removal of several mature Two-veined Hickory trees (*A.binervata*) would be required. The removal of two Prickly-leaved Paperbark (*Melaleuca styphelioides*) may also be necessary.

The proposed rising main would then follow a largely cleared APZ (south of Emerald Drive) through to Meroo Rd (refer to Photo 12, photo-point P10). This area contains remnants of Paperbark swamp vegetation, with scattered Prickly-leaved Paperbark and Tea-tree (*Leptospermum polygalifolium*) occurring. No removal of native vegetation is required through this area.

South along Meroo Rd, the rising main alignment would occur within cleared road verge bordered by mature exotic Radiata Pine trees (refer to Photo 13, photo-point P11), crossing an unnamed tributary of Abernethys Creek and then traversing across open, cleared farm-land to the south-east (refer to Photo 14, photo-point P12), skirting residential development before crossing beneath the railway line and heading south (refer to Photo 15, photo-point P13), again through cleared exotic grassland, to the Bomaderry STP (refer to Photo 16, photo-point P14) with no native vegetation removal required.

The proposed New SPS21 would occur within and existing cleared grassland area (refer to Photo 17, photo-point P15), with a gravity main extending along the Illaroo Rd road verge to the old SPS21 site. The proposed rising main running north from the New SPS21 would parallel the future Far North Collector Rd, being attached to the bridge crossing Bomaderry Creek. Bomaderry Creek is vegetated with River Oak Open Forest in moderate condition, with a disturbed and weedy understorey. The rising main would run beyond the creek through cleared, exotic grassland to connect with an existing gravity main.

No threatened flora or fauna species were observed during surveys and site inspections.

Habitat and targeted survey results

Targeted surveys were undertaken in areas of potential habitat as follows:

- Green and Golden Bell Frog – 6th February 2020
- *Genoplesium baueri* (Brittle Midge Orchid) – 14th April 2020
- *Pterostylis gibbosa* (Illawarra Greenhood) – 8th October 2020
- *Hibbertia stricta* subsp. *furcatula* – 8th October 2020

Targeted survey for Green and Golden Bell Frog (GGBF) was undertaken on 6 February, during the day time, in full sun, along the southern edge of Abernethys Creek in the vicinity of Roseville Rd. The creek at this point is dominated by Cumbungi (*Typha orientalis*) and while no records of the species occur in close proximity to the site, was considered to contain suitable habitat and be within an area of the Shoalhaven River floodplain with similar characteristics to local habitat utilised by known populations of GGBF. The survey was considered prudent given the lack of records in the surrounding area being potentially attributed to a lack of previous survey. The survey as part of the current assessment was undertaken during a time when the species was detectable (aurally and visibly basking) at sites associated with Brundee Swamp. No GGBF were detected within or in close proximity to the site.

Targeted survey for *Genoplesium baueri* was undertaken on 14 April 2020, in areas considered to contain potential habitat (albeit very marginal) for the species. Survey was undertaken along the eastern edge of Bells Lane and through the vegetated unformed section of Abernethys Lane (in the vicinity of photo-points P2 and P5 respectively), following confirmation of flowering at a North Nowra reference site (refer to Photo 18). Transects 3m to no more than 5m apart were undertaken through areas of potential habitat within these locations. *G.baeuri* was not detected within or in close proximity to the site.

Targeted survey for *Pterostylis gibbosa* was undertaken on 8 October 2020, in areas considered to contain potential habitat for the species. Targeted survey for *Hibbertia stricta* subsp. *furcatula* was undertaken in conjunction with this survey as the areas surveyed contained potential habitat for both species. Survey was undertaken along the eastern edge of Bells Lane, through the vegetated unformed section of Abernethys Lane (in the vicinity of photo-points P2 and P5 respectively), and within the disturbed understorey in the vicinity of photo-point P8, following confirmation of flowering at a Worrigee reference site (refer to Photo 19). Transects 3m to no more than 5m apart were undertaken through areas of potential habitat within these locations. Neither *P.gibbosa* or *H. stricta* subsp. *furcatula* were detected within or in close proximity to the site.

Areas containing hollow-bearing trees were noted during the previous constraints assessment. HBTs were not mapped for the current assessment as there are no HBTs occurring within areas which are likely to be impacted by the proposed works.

No Glossy Black Cockatoo or Glider feed tree species (e.g. *Allocasuarina littoralis, Corymbia gummifera* and *Eucalyptus punctata*) were noted within the site. No signs of potential threatened fauna use of the site (e.g. owl whitewash, bandicoot diggings) were noted.

Photos 1 through 19 below show the site and any relevant features.

Photo 1. Site facing east from photo-point P1 – location of MVRS SPS

Photo 2. Site facing south along Bells Lane from photo-point P2 toward Moss Vale Rd

Photo 3. Site facing north along Bells Lane from photo-point P2

Photo 4. Site facing east along Abernethys Lane (unformed section) from photo-point P3

Photo 5. Site facing west toward location of MVRS SPS from photo-point P4. No vegetation removal.

Photo 6. Site facing west at Abernethys Lane from photo-point P5. Note this area would be under-bored.

Photo 7. Site facing south from photo-point P6. No vegetation removal required.

Photo 8. Site facing east from photo-point P7. No vegetation removal required.

Photo 9. Site facing north-east from photo-point P8.

Photo 10. Site facing west from photo-point P9.

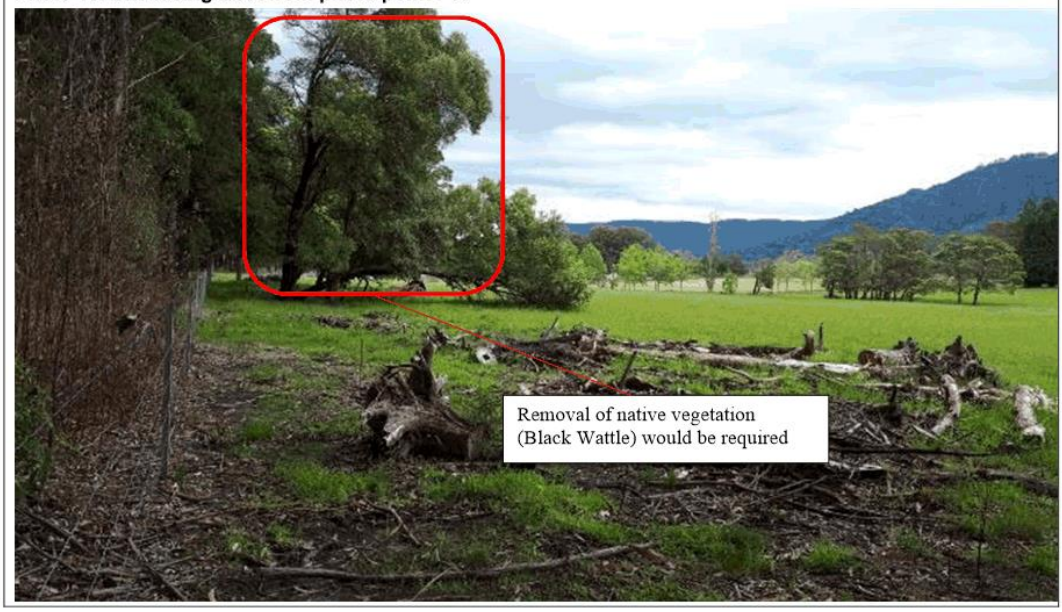


Photo 11. Site facing north from photo-point P9.

Photo 12. Site facing east from photo-point P10. No native vegetation removal required.

Photo 13. Site facing south along Meroo Rd from photo-point P11. No removal of vegetation required.

Photo 14. Site facing south-east from photo-point P12. No removal of vegetation required.

Photo 15. Site facing south from photo-point P13. No removal of vegetation required.

Photo 16. Site facing east toward Bomaderry STP from photo-point P14. No removal of vegetation required.

Photo 17. Site facing north toward location of New SPS21 from photo-point P15

Photo 18 (left). Flowering *Genoplesium baueri* at North Nowra reference site (14 April 2020)
Photo 19 (right). Flowering *Pterostylis gibbosa* at Worrigee reference site (2 October 2020)

3. ASSESSMENT OF LIKELY ENVIRONMENTAL IMPACTS

3.1 Impacts associated with the proposal

The project has been designed to align with existing cleared land and corridors to minimise the impact to native vegetation and habitat. The site is therefore mostly cleared, with cover of exotic grasses (predominantly Kikuyu and Paspalum).

Excavation for the installation of pipes would generally be in the form of trenching. Under-boring (micro tunnel or horizontal directional drilling (HDD)) would be applied where the crossing of creeks, roads and the railway line is required, and would comply with relevant authority approvals. Under-boring is also proposed to be utilised in areas of ecological significance and sensitivity, including vegetation on an unformed section of Abernethys Lane (between Lot 1 DP 1134376 and Lot 601 DP 1223625) containing mature HBTs. Under-boring of creeks and minor watercourses will also be undertaken to minimise the potential impacts to riparian vegetation, creek-bank stability and water quality.

Easements of 5m would be established where required. A 20m wide construction corridor would generally be provided.

The proposal would involve the following disturbance and impacts:

- Clearing of native and exotic vegetation comprising:
    - Possible removal of planted and exotic species including ornamental vegetation associated with the Council owned residential property at 125 Moss Vale Rd (Lot 262 DP 794245) – Silky Oaks, Flame Trees, fruit trees and non-endemic Eucalypt species (refer to Photo 2, photo-point P2), and small exotic ornamental trees and shrubs including Photinia and Box Elder (*Acer negundo*) scattered adjacent to Bells Lane (refer to Photo 3, photo-point P2).
    - Minor clearing of disturbed native understorey vegetation (including *Acacia filicifolia, A.suaveolens, A.binervata, A.floribunda, Pittosporum undulatum, Breynia oblongifolia* and *Kunzea ambigua*) and removal of several mature Two-veined Hickory trees (*A.binervata*) would be required east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372 (refer to Photo 8, photo-point P7; Photo 9, photo-point P8; Photo 10, photo-point P9; and Photo 11, photo-point P9). The removal of two Prickly-leaved Paperbark (*Melaleuca styphelioides*) may also be necessary.
    - No hollow-bearing trees or significant feed trees would be removed or otherwise impacted.
    - No habitat considered significant for threatened flora or any native fauna would be removed or otherwise impacted.
- Excavation comprising a combination of trenching and under-boring to depths ranging from 0.46m to 5.63m below the existing ground surface. The alignment has been designed with consideration of existing Aboriginal heritage records and informed by an Aboriginal

Constraints Analysis (Young 2020) and an Aboriginal Cultural Heritage Due Diligence Assessment (Feary 2020) to ensure avoidance of impact to known records and likely areas of significance. Refer to Section 3.4 for more information.

- Construction of all-weather access tracks to SPSs.
- Excavation, installation of culvert and stabilisation of watercourse for MVRN SPS access track along unformed section of Abernethys Lane. This work would occur in an area mapped as Key Fish Habitat for the purpose of the *Fisheries Management Act 1994* and would therefore require a Fisheries Permit. Refer to Section 3.8 for more information.

Indirect impacts associated with the proposal include contamination of waterways as a result of SPS overflows.

Council's Unit Manager Wastewater Operations provided the following additional information regarding the SPS overflows (refer to D20/450906):

> *All SPSs are designed with an overflow pipe as it is not feasible to design a system with a 100% guarantee that an overflow will never occur.*
>
> *The majority of overflows that do occur at SPSs are a result of extensive wet weather and during this time of overflow discharge the sewerage is already highly diluted. The wet weather flow then mixes with storm flows and has minimal impact on the water way.*
>
> *If an overflow occurs during dry weather the impact of the overflow is assessed and decision for the best course of action is determined. This is all in accordance with EPA requirements.*
>
> *With regards to the design of the overflow structure, the overflow pipe will have a trash grate and preference is to keep the overflow point close to the SPS and hence discharge is overland via a grass swale. So yes an open swale vegetated with sedges would be an acceptable solution. This also helps prevent small overflows form reaching the waterway and allows for some capture of inorganics that are not captured by the trash grate.*

3.2 Threatened species impact assessment (NSW)

Section 1.7 of the EP&A Act 1979 applies the provisions of Part 7 of the NSW *Biodiversity Conservation Act 2016* and Part 7A of the *NSW Fisheries Management Act 1994* that relate to the operation of the Act in connection with the terrestrial and aquatic environment. Each are addressed below.

- ***Part 7A Fisheries Management Act 1994***

Part 7A relates to threatened species conservation. As the proposed activity would not affect aquatic environments supporting vegetation or species protected under this section of the Act, further consideration is unnecessary.

- ***Part 7 Biodiversity Conservation Act 2016***

An assessment of the potential for NSW threatened flora and fauna species occurring on-site or otherwise being impacted by the proposal was undertaken (refer to Appendix B). The following species and endangered ecological communities are known to occur on-site or are considered to have some potential to occur on-site or be otherwise impacted by the proposal, and therefore required further assessment under Part 7 of the NSW Biodiversity Conservation Act 2016:

- *Genoplesium baueri* Bauer's Midge Orchid
- *Pterostylis gibbosa* Illawarra Greenhood
- Green and Golden Bell Frog *Litoria aurea*
- Eastern Bentwing-bat *Miniopterus orianae oceanensis*
- Eastern False Pipistrelle *Falsistrellus tasmaniensis*
- Eastern Freetail-Bat *Micronomus norfolkensis*
- Greater Broad-nosed Bat *Scoteanaux ruepelli*
- Large-eared Pied Bat *Chalinobolus dwyeri*
- Southern Myotis (Large-footed Myotis) *Myotis macropus*
- Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*
- Dusky Woodswallow *Artamus cyanopterus cyanopterus*
- Gang-gang Cockatoo *Callocephalon fimbriatum*
- Glossy Black-cockatoo *Calyptorhynchus lathami*
- Little Lorikeet *Glossopsitta pusilla*
- Masked Owl *Tyto novaehollandiae*
- Powerful Owl *Ninox strenua*
- Square-Tailed Kite *Lophoictinia isura*
- Varied Sittella *Daphoenositta chrysoptera*
- Grey-headed Flying-fox *Pteropus poliocephalus*
- Yellow-bellied Glider - *Petaurus Australis*
- *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion* endangered ecological community

Section 7.3 of the Act provides a 'five-part' test to determine whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. Each Part is addressed below:

Part A - In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be place at risk of extinction.

Bauer's Midge Orchid (*Genoplesium baueri*)

Bauer's Midge Orchid is a small fleshy, brittle, yellowish-green or reddish terrestrial orchid to 6-15 cm high. The species grows in dry sclerophyll forest and moss gardens over sandstone, flowering in February to March. Currently the species is known from just over 200 plants across 13 sites (OEH 2018a). The number of populations of *Genoplesium baueri* is uncertain. Based on records from herbaria and sightings, there is estimated to be between 20 and 30 populations. Some plants do not regularly appear each year, despite favourable seasonal conditions. When plants do appear, they are only above ground for approximately 2 months before dying back to a dormant state. Whilst the appearance of plants above ground may fluctuate from year to year, individual plants may remain dormant in the soil. Nevertheless the number of plants of *G. baueri* is considered to be low. Flowering is usually around December to April. It has been reported that *G. baueri* is most often seen soon after fire and flowering may be enhanced by summer fires. The species usually grows in heathland to shrubby woodland on sands or sandy loams or open forest, shrubby forest and heathy forest on well-drained sandy and gravelly soils. The species does not produce a new tuber at the end of each growing season, instead it persists from the one tuber-like perennial root. Flowering usually occurs from December to April. It is reported that the species is most often seen soon after fire. Despite favourable seasonal conditions, some plants do not regularly appear each year. When they do appear, plants are visible above ground for approximately two months before dying back into dormancy (TSSC 2013).

Marginal potential habitat was considered to occur within or in close proximity to the site along the eastern edge of Bells Lane and through the vegetated unformed section of Abernethys Lane (in the vicinity of photo-points P2 and P5 respectively).

Targeted survey for the species was undertaken in these areas following confirmation of flowering at a nearby reference site (refer to Section 2.1). The species was not detected.

It is concluded that the species is unlikely to occur within the site.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372.

It is considered unlikely therefore that Bauer's Midge Orchid would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Illawarra Greenhood (*Pterostylis gibbosa*)

The Illawarra Greenhood has a rosette of rounded leaves at the base of the stem, each to 35 mm long. In addition there are up to six leaves that sheath the flower stem, which may be 45 cm high and bear up to seven flowers. The flowers are bright glossy green with transparent patches in the hood. The very broad black labellum ('lip' petal) protrudes from the front of the flower. The species

is known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). It is apparently extinct in western Sydney which is the area where it was first collected (1803). All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum *Eucalyptus tereticornis*, Woollybutt *E. longifolia* and White Feather Honey-myrtle *Melaleuca decora*. Near Nowra, the species grows in an open forest of Spotted Gum *Corymbia maculata*, Forest Red Gum and Grey Ironbark *E. paniculata*. The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The leaf rosette grows from an underground tuber in late summer, followed by the flower stem in winter. After a spring flowering, the plant begins to die back and seed capsules form (if pollination has taken place). As with many other greenhoods, male fungus gnats are believed to be the pollinator. The Illawarra Greenhood can survive occasional burning and grazing because of its capacity to reshoot from an underground tuber (OEH 2018b).

Potential habitat was considered to occur for Illawarra Greenhood within or in close proximity to the site along the eastern edge of Bells Lane, through the vegetated unformed section of Abernethys Lane (in the vicinity of photo-points P2 and P5 respectively) and within patches of woodland vegetation east of the Princes Highway through to the APZ south of Emerald drive.

Targeted survey for the species was undertaken in these areas following confirmation of flowering at a nearby reference site (refer to Section 2.1). The species was not detected.

It is concluded that the species is unlikely to occur within the site.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. Other areas of potential vegetation including the vegetated unformed section of Abernethys Lane would be avoided.

It is considered unlikely therefore that Illawarra Greenhood would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Green and Golden Bell Frog (*Litoria aurea*)

Green and Golden Bell Frog inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). Optimum habitat for the species includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), with a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. Males call while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation. Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs (OEH 2017g).

Marginal potential habitat was considered to occur for Green and Golden Bell Frog along the southern edge of Abernethys Creek in the vicinity of Roseville Rd. The creek at this point is dominated by Cumbungi (*Typha orientalis*) and while no records of the species occur in close proximity to the site, was considered to contain suitable habitat and be within an area of the Shoalhaven River floodplain with similar characteristics to local habitat utilised by known populations of GGBF. Survey and further assessment was considered prudent given the lack of records in the surrounding area being potentially attributed to a lack of previous survey. The survey was undertaken during a time when the species was detectable (aurally and visibly basking) at sites associated with Brundee Swamp (refer to Section 2.1). No GGBF were detected within or in close proximity to the site.

This area of potential habitat does not have connectivity with other potential or known areas of habitat for the species.

The nearest records on the northern side of the Shoalhaven River occur over 10km to the east (associated with the Coomondery Swamp GGBF population).

It is concluded that the species is unlikely to occur within the site.

The potential habitat within the site would not be removed or otherwise impacted by the proposal.

It is considered unlikely therefore that the Green and Golden Bell Frog would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Microchiropteran bats: Eastern Bentwing-bat (*Miniopterus orianae oceanensis*); Eastern False Pipistrelle (*Falsistrellus tasmaniensis*); Eastern Freetail-Bat (*Micronomus norfolkensis*); Greater Broad-nosed Bat (*Scoteanaux ruepelli*); Large-eared Pied Bat (*Chalinobolus dwyeri*) and Southern Myotis (Large-footed Myotis) (*Myotis macropus*)

Eastern Bentwing-bat (*Miniopterus orianae oceanensis*) primarily roosts in caves, but it also uses derelict mines, storm-water tunnels, buildings and other man-made structures. The species forms discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. The species hunts in forested areas, catching moths and other flying insects above the tree tops (OEH 2017i).

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings, however roost requirements poorly known. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer (OEH 2017b).

Eastern Freetail-Bat (*Micronomus norfolkensis*) occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. The species roosts mainly in tree hollows but will also roost under bark or in man-made structures. It will usually change breeding sites regularly (every few days), rendering it very difficult to confirm breeding sites. It has been known to occasionally aggregate in large breeding groups (including in buildings). It is usually solitary but has also been recorded roosting communally. The Eastern Freetail-Bat is considered to be probably insectivorous (OEH 2017c).

Greater Broad-nosed Bat (*Scoteanax rueppellii*) utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. The species forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young (OEH 2017f).

Large-eared Pied Bat (*Chalinolobus dwyeri*) roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon arie*l), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. The species is found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. It is likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring (OEH 2017j).

Southern Myotis (*Myotis Macropus*) generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. The species is dependent on waterways with pools of 3m wide or greater for foraging, with habitat surrounding the waterways (usually within 200m) being used for breeding and roosting. The species will forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December (OEH 2017n).

Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, it flies high and fast over the forest canopy, but lower in more open country. The species forages in most habitats across its very wide range, with and without trees and appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements of the species are unknown; there is speculation about a migration to southern Australia in late summer and autumn (OEH 2017r).

The site contains suitable foraging habitat for each of the above-listed microbats and potential roosting habitat (hollow-bearing trees) for Eastern False Pipistrelle, Eastern Freetail-Bat, Greater Broad-nosed Bat, Southern Myotis and Yellow-bellied Sheathtail-bat. Suitable roosting habitat for Eastern Bentwing Bat and Large-eared Pied Bat (primarily caves) does not occur within the site.

Targeted survey associated with investigations for the Far North Collector Road (Bryant 2020) detected Southern Myotis, Eastern Bentwing-bat and Little Bentwing-bat with moderate confidence and Large-eared Pied Bat with low confidence from ANABAT data recorded in the vicinity of the two HBTs adjacent to the proposed MVRS SPS. Little Corellas were incidentally observed utilising hollows in the Spotted Gum.

No hollow-bearing trees including those adjacent to the proposed MVRS SPS and those occurring within the vegetated unformed section of Abernethys Lane would be removed or otherwise impacted as a result of the proposal.

No disturbance to riparian vegetation would occur.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

Foraging and potential roosting habitat will therefore not be removed or otherwise significantly impacted.

Works would occur during normal construction hours, so would not affect the nocturnal foraging activities of these species.

It is considered unlikely therefore that the Eastern Bentwing Bat, Eastern False Pipistrelle, Eastern Freetail-Bat, Greater Broad-nosed Bat, Large-eared Pied Bat, Southern Myotis and Yellow-bellied Sheathtail-bat would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)

The Dusky Woodswallow medium-sized bird (16-19.5 cm, 35 g), mostly dark grey-brown with a merging to blackish on its longish tail. The species is widespread in eastern, southern and south western Australia, occurring throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. The Dusky Woodswallow primarily inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest, also being found in farmland, usually at the edges of forest or woodland. The species primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water and occasionally will take nectar, fruit

and seed. It also frequently hovers, sallies and pounces under the canopy, primarily over leaf litter and dead timber. Depending on location and local climatic conditions (primarily temperature and rainfall), the dusky woodswallow can be resident year round or migratory. In NSW, after breeding, birds migrate to the north of the state and to south-eastern Queensland, while Tasmanian birds migrate to south-eastern NSW after breeding. Migrants generally depart between March and May, heading south to breed again in spring. There is some evidence of site fidelity for breeding. Although dusky woodswallows generally breed as solitary pairs or occasionally in small flocks, large flocks may form around abundant food sources in winter. Large flocks may also form before migration, which is often undertaken with other species. The species nests in an open, cup-shape, made of twigs, grass, fibrous rootlets and occasionally casuarina needles, and may be lined with grass, rootlets or infrequently horsehair, occasionally unlined. Nest sites vary greatly, but generally occur in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post. Nest sites may be exposed or well concealed by foliage (OEH 2017a).

Marginal habitat occurs for the Dusky Woodswallow within or in close proximity to the site along the eastern edge of Bells Lane, through the vegetated unformed section of Abernethys Lane (in the vicinity of photo-points P2 and P5 respectively) and within patches of woodland vegetation east of the Princes Highway through to the APZ south of Emerald drive. The vegetation within the site occurs on edges in fragmented, disturbed and modified landscapes.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. Other areas of potential vegetation including the vegetated unformed section of Abernethys Lane would be avoided. No canopy trees would be removed. The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

No nests were observed during surveys. The vegetation within the site occurs on edges in fragmented, disturbed and modified landscapes. It is considered unlikely that the species would utilise the site for breeding.

Foraging and potential roosting habitat will therefore not be removed or otherwise significantly impacted.

It is considered unlikely therefore that the Dusky Woodswallow would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Gang-gang Cockatoo (*Callocephalon fimbriatum*)

In spring and summer, the species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora*) woodland

and occasionally in temperate rainforests. Gang-gang Cockatoo favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts. Breeding is generally from Oct-Jan (OEH 2017d).

The site and adjacent areas contain suitable nesting and foraging habitat for Gang-gang Cockatoos.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. No canopy trees would be removed. The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

No hollow-bearing trees including those adjacent to the proposed MVRS SPS and those occurring within the vegetated unformed section of Abernethys Lane would be removed or otherwise impacted as a result of the proposal. Note also that surveys in October associated with the Far North Collector Road investigations did not detect the species utilising the HBTs adjacent to the proposed MVRS SPS (Bryant 2020).

Foraging and potential roosting habitat will therefore not be removed or otherwise significantly impacted.

It is considered unlikely therefore that the Gang-gang Cockatoo would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Glossy Black-cockatoo *Calyptorhynchus lathami*

The Glossy Black-cockatoo inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of She-oak occur. Black She-oak (*Allocasuarina littoralis*) and Forest She-oak (*A. torulosa*) are important foods. Inland populations feed on a wide range of She-oaks, including Drooping She-oak, *Allocasuaraina diminuta*, and *A. gymnathera*. Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping She-oak, but also recorded in open woodlands dominated by Belah (*Casuarina cristata*). The species feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. Glossy Black-cockatoo is dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May (OEH 2017e).

The site and adjacent areas contain suitable nesting and foraging habitat for Glossy Black Cockatoos.

No feed trees (as evidenced by chewed Allocasuarina cones) were detected within the study area. No *Allocasuarina* species were found within areas where clearing for the project will occur.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. No canopy trees would be removed. The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

No hollow-bearing trees including those adjacent to the proposed MVRS SPS and those occurring within the vegetated unformed section of Abernethys Lane would be removed or otherwise impacted as a result of the proposal. Note also that surveys in March associated with the Far North Collector Road investigations did not detect the species utilising the HBTs adjacent to the proposed MVRS SPS (Bryant 2020).

Foraging and potential roosting habitat will therefore not be removed or otherwise significantly impacted.

It is considered unlikely therefore that the Glossy Black Cockatoo would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Little Lorikeet *Glossopsitta pusilla*

The Little Lorikeet forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. The species feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. The Little Lorikeet is gregarious, travelling and feeding in small flocks (<10), though often with other lorikeets. Flocks numbering hundreds are still occasionally observed and may have been the norm in past centuries. The species roosts in treetops, often distant from feeding areas. Nests are in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like Allocasuarina. The nesting season extends from May to September. In years when flowering is prolific, Little Lorikeet pairs can breed twice, producing 3-4 young per attempt. However, the survival rate of fledglings is unknown (OEH 2017k).

The site and adjacent areas contain suitable nesting and foraging habitat for Little Lorikeet.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. No canopy trees would be removed. The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

No hollow-bearing trees including those adjacent to the proposed MVRS SPS and those occurring within the vegetated unformed section of Abernethys Lane would be removed or otherwise impacted as a result of the proposal. Note the HBTs adjacent to the proposed MVRS SPS do not appear to contain suitably sized hollows for Little Lorikeet.

Foraging and potential roosting habitat will therefore not be removed or otherwise significantly impacted.

It is considered unlikely therefore that the Little Lorikeet would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Masked Owl (*Tyto novaehollandiae*)

The Masked Owl lives in dry eucalypt forests and woodlands from sea level to 1100 m. The species is a forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds from May-Aug in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting (OEH 2017l).

The site and adjacent areas contain suitable nesting and foraging habitat for Masked Owl.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. No canopy trees would be removed. The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

No hollow-bearing trees including those adjacent to the proposed MVRS SPS and those occurring within the vegetated unformed section of Abernethys Lane would be removed or otherwise impacted as a result of the proposal.

Foraging and potential roosting habitat will therefore not be removed or otherwise significantly impacted.

Works would occur during normal construction hours, so would not affect the nocturnal foraging activities of these species.

It is considered unlikely therefore that the Masked Owl would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Powerful Owl (*Ninox strenua*)

The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The species requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in

dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species. The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. There may be marked regional differences in the prey taken by Powerful Owls. For example in southern NSW, Ringtail Possum make up the bulk of prey in the lowland or coastal habitat. At higher elevations, such as the tableland forests, the Greater Glider may constitute almost all of the prey for a pair of Powerful Owls. Flying foxes are important prey in some areas; birds comprise about 10-50% of the diet depending on the availability of preferred mammals. As most prey species require hollows and a shrub layer, these are important habitat components for the owl. Pairs of Powerful Owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats a mere 400 can support a pair; where hollow trees and prey have been depleted the owls need up to 4000 ha. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him. Powerful Owls are monogamous and mate for life. Nesting occurs from late autumn to mid-winter (generally May-Aug), but is slightly earlier in north-eastern NSW (late summer - mid autumn). Clutches consist of two dull white eggs and incubation lasts approximately 38 days (OEH 2017m).

The site and adjacent areas contain suitable nesting and foraging habitat for Powerful Owl.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. No canopy trees would be removed. The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

No hollow-bearing trees including those adjacent to the proposed MVRS SPS and those occurring within the vegetated unformed section of Abernethys Lane would be removed or otherwise impacted as a result of the proposal.

Foraging and potential roosting habitat will therefore not be removed or otherwise significantly impacted.

Works would occur during normal construction hours, so would not affect the nocturnal foraging activities of these species.

It is considered unlikely therefore that the Powerful Owl would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Square-Tailed Kite *Lophoictinia isura*

The Square-tailed Kite is a reddish, medium-sized, long-winged raptor. A key character in flight is the long fingered, upswept wings with a large white patch at the base of the barred 'fingers'. In

NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. The Square-tailed Kite is found in a variety of timbered habitats including dry woodlands and open forests, showing a particular preference for timbered watercourses. It appears to occupy large hunting ranges of more than 100km2. In arid north-western NSW, it has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. This raptor is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage (OEH 2017o).

The site and adjacent areas contain suitable nesting and foraging habitat for the Square-tailed Kite.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372.

No large stick nests were observed within the site during surveys. No canopy trees would be removed as part of the proposal. No riparian vegetation would be removed or otherwise impacted.

Foraging and potential nesting habitat will therefore not be removed or otherwise significantly impacted.

It is considered unlikely therefore that the Square-tailed Kite would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Varied Sittella (*Daphoenositta chrysoptera*)

The Varied Sittella is a small and highly mobile species. Varied Sittellas are more active and acrobatic among branches than the larger treecreepers. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. It feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years (OEH, 2017p).

Marginal habitat occurs for the Varied Sittella within or in close proximity to the site along the eastern edge of Bells Lane, through the vegetated unformed section of Abernethys Lane (in the vicinity of photo-points P2 and P5 respectively) and within patches of woodland vegetation east of the Princes Highway through to the APZ south of Emerald drive. The vegetation within the site occurs on edges in fragmented, disturbed and modified landscapes.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of

Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. Other areas of potential vegetation including the vegetated unformed section of Abernethys Lane would be avoided. No canopy trees would be removed. The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

No nests were observed during surveys. The vegetation within the site occurs on edges in fragmented, disturbed and modified landscapes. It is considered unlikely that the species would utilise the site for breeding.

Foraging and potential roosting habitat will therefore not be removed or otherwise significantly impacted.

It is considered unlikely therefore that the Dusky Woodswallow would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Grey-headed Flying-fox

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is the largest Australian bat, with a head and body length of 23 - 29 cm. It has dark grey fur on the body, lighter grey fur on the head and a russet collar encircling the neck. The wing membranes are black and the wingspan can be up to 1 m. It can be distinguished from other flying-foxes by the leg fur, which extends to the ankle. Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. This species occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Annual mating commences in January and conception occurs in April or May; a single young is born in October or November. Site fidelity to camps is high; some camps have been used for over a century. GHFF can travel up to 50 km from the camp to forage; commuting distances are more often <20 km. They feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines, also foraging in cultivated gardens and fruit crops (OEH 2017h).

Foraging habitat occurs for the Grey-headed Flying-fox where flowering Eucalypt trees occur within or in close proximity to the site along the eastern edge of Bells Lane, through the vegetated unformed section of Abernethys Lane (in the vicinity of photo-points P2 and P5 respectively) and within patches of woodland vegetation east of the Princes Highway through to the APZ south of Emerald drive.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. Other areas

of potential vegetation including the vegetated unformed section of Abernethys Lane would be avoided. No canopy trees would be removed. The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

No GHFF camps occur in close proximity to the site. The nearest camp currently occurs at Bomaderry Creek / Illowra Wetlands, approximately 1.3km south-west of the southern-most part of the site.

Foraging and roosting habitat will therefore not be removed or otherwise significantly impacted as a result of the proposal.

It is considered unlikely therefore that the Grey-headed Flying-fox would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Yellow-bellied Glider (*Petaurus australis*)

The Yellow-bellied Glider occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. The species feeds primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein. Sap is extracted by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar. Yellow-bellied Gliders live in small family groups of two - six individuals and are nocturnal. The species use dens, often in family groups, in hollows of large trees. The Yellow-bellied Glider is very mobile and occupies large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources. Dispersal requires continuous habitat connectivity (gliding distance around 120m). Typically produce one young per year (in high quality habitat) but during poor conditions may only breed every second year. Key threats to the species include loss of hollows (generally >30cm) and important feed trees as a result of wildfire, in addition to landscape fragmentation. A highly vocal species with loud, high-pitched shrieks audible over 500m away (OEH 2017q).

The site and adjacent areas contain marginal suitable foraging habitat and potential den habitat (HBTs) for the Yellow-bellied Glider.

No feed trees (as evidenced by v-shaped or other glider scars) were detected within the study area. No typical feed tree species including Red Bloodwood (*Corymbia gummifera*) or Grey Gum (*Eucalyptus punctata*) were noted within areas where clearing for the project will occur.

Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. No canopy trees would be removed. The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

No hollow-bearing trees including those occurring within the vegetated unformed section of Abernethys Lane would be removed or otherwise impacted as a result of the proposal. Note that the HBTs adjacent to the proposed MVRS SPS are too isolated to be utilised by Yellow-bellied Glider.

Foraging and potential roosting habitat will therefore not be removed or otherwise significantly impacted.

It is considered unlikely therefore that the Yellow-bellied Glider would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Part B - In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

- ***(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***
- ***(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction***

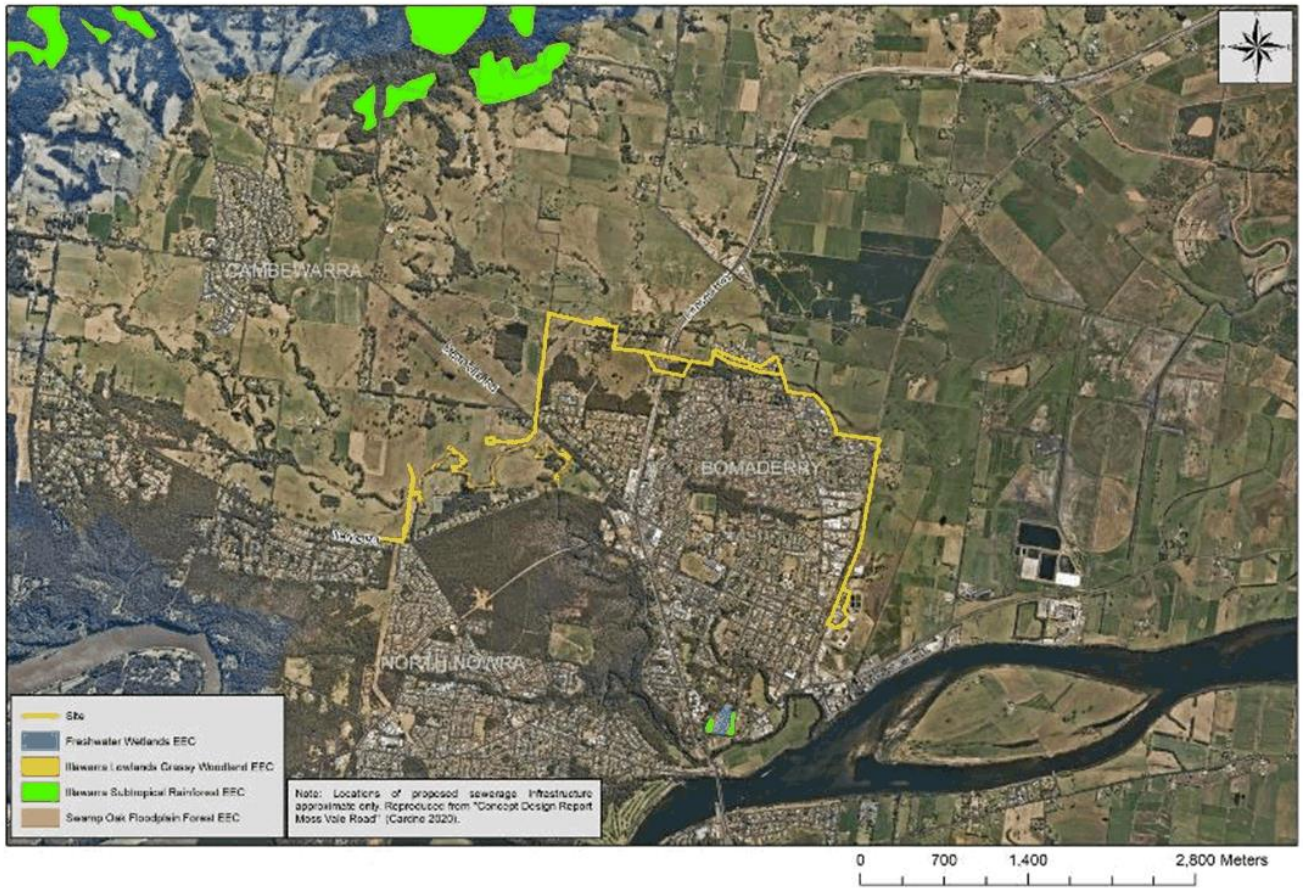
Only Illawarra Lowland Grassy Woodland EEC is mapped as occurring in close proximity to the site of the proposed works (refer to Figure 6).

Illawarra Lowland Grassy Woodland (ILGW) in the Sydney Basin Bioregion Endangered Ecological Community

This community comprises vegetation types that occupy the Illawarra coastal plain and escarpment foothills. Characteristic tree species include Forest Red Gum *Eucalyptus tereticornis*, Thin-leaved Stringybark *Eucalyptus eugenioides*, Woollybutt *Eucalyptus longifolia*, Coast Grey Box *Eucalyptus bosistoana* and White Feather Honey-myrtle *Melaleuca decora*. The understorey is not necessarily grassy as moist forest vegetation types are also included within this broad community. Common shrub species include *Acacia mearnsii* and *Dodonaea viscosa* subsp. *angustifolia*. Floodplain vegetation dominated by Casuarina species or rainforests on latite soils are not part of this community. Illawarra Lowlands Grassy Woodland occurs on relatively gently sloping to undulating lands less than about 200 m elevation on Berry Siltstone, Budgong Sandstone and Quaternary alluvium. Much of this community has been cleared and it now occurs chiefly as scattered fragments. This EEC provides habitat for the endangered orchid *Pterostylis gibbosa*. Characteristic tree species in the Illawarra Lowlands Grassy Woodland are *Eucalyptus tereticornis, Eucalyptus eugenioides, Eucalyptus longifolia, Eucalyptus bosistoana* and *Melaleuca decora* (NSW Scientific Committee 2011).

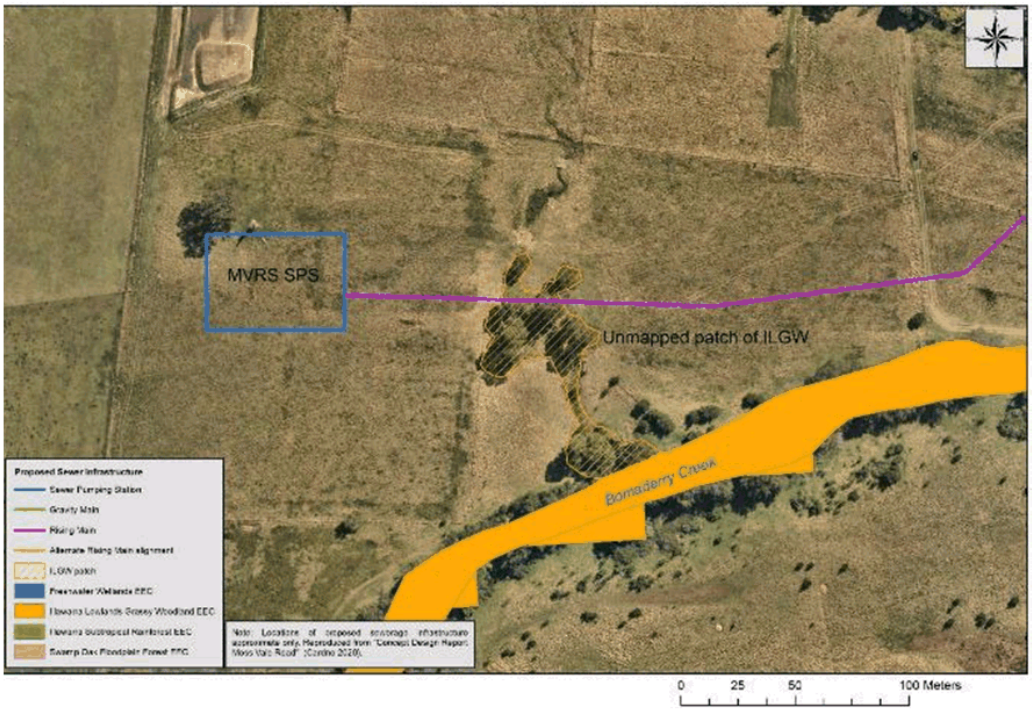
A small patch of *Forest Red Gum – Thin-leaved Stringybark grassy woodland*, regarded as being consistent with *Illawarra Lowlands Grassy Woodland* endangered ecological community, occurs within a minor, unnamed watercourse between the site of proposed MVRS SPS and Moss Vale Rd, along the future Far North Collector Rd alignment (in the vicinity of photo-point

Figure 6. Endangered Ecological Communities (EECs) mapped as occurring in the surrounding locality



P1 – refer also to Photo 1). This patch of vegetation is in a degraded condition, being small (approx. 2302m^2), open and exposed and containing reduced native species diversity. It is comprised of *Eucalyptus tereticornis, E.amplifolia, Angophora floribunda*, *Melaleuca linarifolia* and *M.styphelioides* with the ground stratum consistent with the surrounding exotic grassland species composition, dominated by Caterpillar Grass (*Paspalum dilatatum*). The patch is disconnected from the Bomaderry Creek riparian corridor, but remains a viable occurrence of the ecological community.

Figure 7. Extent of unmapped Illawarra Lowlands Grassy Woodland (ILGW) EEC in proximity to the site



It is proposed that this watercourse would be under-bored to minimise impacts to vegetation and the waterway. If it is not possible to under-bore this location, the construction corridor must be reduced to no more than 5m and all native trees and shrubs retained to every practical extent. The patch of vegetation is open (refer to Photo 20), with the northern part of the patch where the rising main would pass through (over a distance of approx. 26m), containing Paperbarks, one small Rough-barked Apple and no mature Forest Red Gum (*Eucalyptus tereticornis*) trees. Sediment and erosion controls would be installed and maintained until completion of works and stabilisation of the site has been achieved to minimise impacts on the watercourse and ecological community associated with erosion and sediment deposition. Any impacted vegetation components of the ecological community would be revegetated.

Note that while *Illawarra Lowlands Grassy Woodland* (associated with PCT838) is mapped as occurring along the length of Bomaderry Creek between the powerline easement adjacent to the southern end of the future Far North Collector Road and Bomaderry Regional Park near the eastern end of West Cambewarra Road, field survey during investigations for the Far North Collector Road determined that the vegetation in this area is River Oak Open Forest, including the riparian vegetation where the Far North Collector Road and rising main from the current proposal would bridge Bomaderry Creek (Bryant 2020). PCT838 was found to be confined to a short strip of vegetation within Bernie Regan Sporting Complex land adjacent to Lot 1 DP 848630, in addition to the small patch of remnant grassy woodland within Lot 262 DP 794245 (indicated in Figure 7 above). Beyond this, one lone *Eucalyptus tereticornis* occurs east from the remnant patch on the edge of the River Oak Open Forest adjacent to Bomaderry Creek. Other scattered Eucalypts occurring within the River Oak Open Forest are *Eucalyptus saligna x botryoides* which is not an indicative or associated species of PCT838.

Photo 20. Illawarra Lowlands Grassy Woodland (ILGW) EEC in proximity to the site

The proposal is therefore unlikely to adversely affect or modify the extent or composition of Illawarra Lowlands Grassy Woodland EEC such that its local occurrence is likely to be placed at risk of extinction.

Part C - In relation to the habitat of a threatened species or ecological community:

(iii)the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity

(iv)whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(v) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.

No important habitat for threatened species would be removed or otherwise significantly impacted (see Part A).

No EEC would be fragmented or isolated, nor removed or modified to an extent that would affect the long term survival of the EEC occurring in the locality (refer to Part B).

The proposal will therefore not affect the long-term survival of any threatened species or endangered ecological community in the locality.

Part D – Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).

No "*areas of outstanding biodiversity values"* have been declared in the City of Shoalhaven.

Part E – Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Clearing of native vegetation is listed as a key threatening process, defined by the Scientific Committee's determination as

the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long-term modification, of the structure, composition and ecological function of a stand or stands.

Clearing of native vegetation has been shown to:

- cause widespread fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity;
- lead to soil and bank erosion, increased salinity and loss of productive land.

The project has been designed to align with existing cleared land and corridors to minimise the impact to native vegetation and habitat. The proposal as a result, would involve minimal removal of native vegetation to facilitate installation of the proposed sewer infrastructure. Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. No canopy trees would be removed.

The impact to native vegetation would therefore be very minimal and unlikely to affect foraging habitat for these species.

There would be no destruction of important habitat nor impact to any locally occurring threatened species (see Part 1).

The proposed vegetation clearing would therefore not result in fragmentation of ecological communities or disrupt ecological function.

The impacts of the key threatening process of clearing of native vegetation would therefore be minimised and managed as part of the proposal.

3.3 Threatened species impact assessment (Commonwealth EPBC Act 1999)

A Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Report was generated on 14 October 2020. Of those threatened species and endangered ecological communities reported as likely occurring or having habitat within the area of the report, the following were considered to have potential habitat within the site and require further assessment:

- *Genoplesium baueri* Bauer's Midge Orchid (Endangered)
- *Pterostylis gibbosa* Illawarra Greenhood (Endangered)
- Green and Golden Bell Frog *Litoria aurea* (Vulnerable)
- Large-eared Pied Bat *Chalinobolus dwyeri* (Vunerable)
- Grey-headed Flying-fox *Pteropus poliocephalus* (Vulnerable)
- Illawarra and South Coast Lowland Forest and Woodland ecological community (Critically Endangered)

Additional, highly mobile species including migratory birds may occur occasionally and transiently within the vicinity of the proposed activity but would not be affected by the proposal.

Table 2. EPBC Significant impact assessment

Critically endangered and endangered species - Significant impact criteria Species to consider: **Bauer's Midge Orchid (*Genoplesium baueri*)** **Illawarra Greenhood (*Pterostylis gibbosa*)**	
Criteria	***Assessment***
lead to a long-term decrease in the size of a population	Targeted survey for these species was undertaken in areas of suitable habitat following confirmation of flowering at a nearby reference sites (refer to Section 2.1). Neither species was detected. It was concluded that these species are unlikely to occur within the site. No population of either species would be affected.
reduce the area of occupancy of the species	No
fragment an existing population into two or more populations	No

adversely affect habitat critical to the survival of a species	Potential habitat within the site is considered marginal for Illawarra Greenhood and very marginal for Bauer's Midge Orchid. No populations of either species are known to occur in close proximity to the site.
disrupt the breeding cycle of a population	No
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. Other areas of potential vegetation including the vegetated unformed section of Abernethys Lane would be avoided.
result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	No invasive species will be introduced
introduce disease that may cause the species to decline	No disease is likely to be introduced
interfere with the recovery of the species	No
Summary	It is considered unlikely therefore that Illawarra Greenhood and Bauer's Midge Orchid would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.
Vulnerable species - Significant impact criteria Species to consider: **Green and Golden Bell Frog (*Litoria aurea*) – (GGBF)** **Large-eared Pied Bat (*Chalinobolus dwyeri*)** **Grey-headed Flying-fox (*Pteropus poliocephalus*) – (GHFF)**	
Criteria	***Assessment***
lead to a long-term decrease in the size of an important population of a species	Survey was undertaken for GGBF in area of potential habitat (Abernethys Creek in the vicinity of Roseville Rd) when species was detectable. GGBF was not detected on site and is considered unlikely to utilise the site. This area of potential habitat does not have connectivity with other potential or known areas of habitat for the species. The nearest records on the northern side of the Shoalhaven River occur over 10km to the east (associated with the Coomondery Swamp GGBF population). The proposal would therefore not impact a population of the species. No roosting and breeding habitat occurs within the site for Large-eared Pied Bat. Native vegetation removal would be minimal and not affect suitable foraging habitat. The proposal would therefore not impact a population of the species.

	No GHFF camps occur in close proximity to the site. The nearest camp currently occurs at Bomaderry Creek / Illowra Wetlands, approximately 1.3km south-west of the southern-most part of the site. No canopy trees would be removed. The impact to native vegetation would therefore be minimal and unlikely to affect foraging habitat for these species. The proposal would therefore not impact a population of the species. No fragmentation of vegetation or severing of movement corridors would occur.
reduce the area of occupancy of an important population	No
fragment an existing important population into two or more populations	No
adversely affect habitat critical to the survival of a species	No important habitat will be impacted
disrupt the breeding cycle of an important population	No
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Native vegetation removal would be limited to disturbed understorey vegetation and several mature Two-veined Hickory trees east of the Princes Highway through to the APZ south of Emerald drive, including the southern and eastern boundary of Lot 502 DP 1221372. Other areas of potential vegetation including the vegetated unformed section of Abernethys Lane would be avoided. No canopy trees would be removed. The impact to native vegetation would therefore be very minimal and would not significantly impact available habitat for these species.
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No invasive species will be introduced
introduce disease that may cause the species to decline	No disease is likely to be introduced
interfere substantially with the recovery of the species	No
Critically endangered and endangered ecological communities - Significant impact criteria Ecological communities to consider: **Illawarra and South Coast Lowland Forest and Woodland ecological community**	
Criteria	***Assessment***
reduce the extent of an ecological community	DoEE (2017) defines the "Extent of Occurrence" as: the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of an

	ecological community, excluding cases of vagrancy. This measure may exclude discontinuities or disjunctions within the overall distributions of the ecological community (e.g. large areas of obviously unsuitable habitat). This essentially refers to the National occurrence of an ecological community. The ecological community is known to occur from north of Wollongong to Moruya and inland to the Ettrema IBRA subregion (TSSC 2016). Any impact to the ecological community within the site would therefore not reduce the community's extent.
fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	It is proposed that this area of vegetation would be under-bored to minimise impacts to vegetation and the waterway. If it is not possible to under-bore this location, the construction corridor must be reduced to no more than 5m and all native trees and shrubs retained to every practical extent. The patch of vegetation is open (refer to Photo 20), with the northern part of the patch where the rising main would pass through (over a distance of approx. 26m), containing Paperbarks, one small Rough-barked Apple and no mature Forest Red Gum (Eucalyptus tereticornis) trees. Any impacted vegetation components of the ecological community would be revegetated. The proposal would therefore not fragment the community.
adversely affect habitat critical to the survival of an ecological community	No. See previous response.
modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	No. Sediment and erosion controls would be installed and maintained until completion of works and stabilisation of the site has been achieved to minimise impacts on the watercourse and ecological community associated with erosion and sediment deposition. The works would not affect the hydrology of the site.
cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	No. The patch of vegetation is open (refer to Photo 20), with the northern part of the patch where the rising main would pass through (over a distance of approx. 26m), containing Paperbarks, one small Rough-barked Apple and no mature Forest Red Gum (Eucalyptus tereticornis) trees. Any impacted vegetation components of the ecological community would be revegetated.
cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:	No. See previous response.

-- assisting invasive species, that are harmful to the listed ecological community, to become established, or -- causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	
interfere with the recovery of an ecological community	No.
Summary	It is considered unlikely therefore that Illawarra and South Coast Lowland Forest and Woodland ecological community would be significantly impacted by the proposed works and the proposed activity is unlikely to adversely affect, fragment or modify the extent or composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or its ecological function disrupted.

3.4 Indigenous heritage

Under Section 86 of the NSW *National Parks and Wildlife Act 1974* (NPW Act) it is an offence to disturb, damage, or destroy any Aboriginal object without an Aboriginal Heritage Impact Permit (AHIP). The Act, however, provides that if a person who exercises 'due diligence' in determining that their actions will not harm Aboriginal objects has a defence against prosecution if they later unknowingly harm an object without an AHIP (Section 87(2) of the Act). To effect this, the NSW Department of Environment, Climate Change and Water have prepared the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wale*s (hereafter referred to as the 'Due Diligence Guidelines) to assist individuals and organisations to exercise due diligence when carrying out activities that may harm Aboriginal objects and to determine whether they should apply for an AHIP.

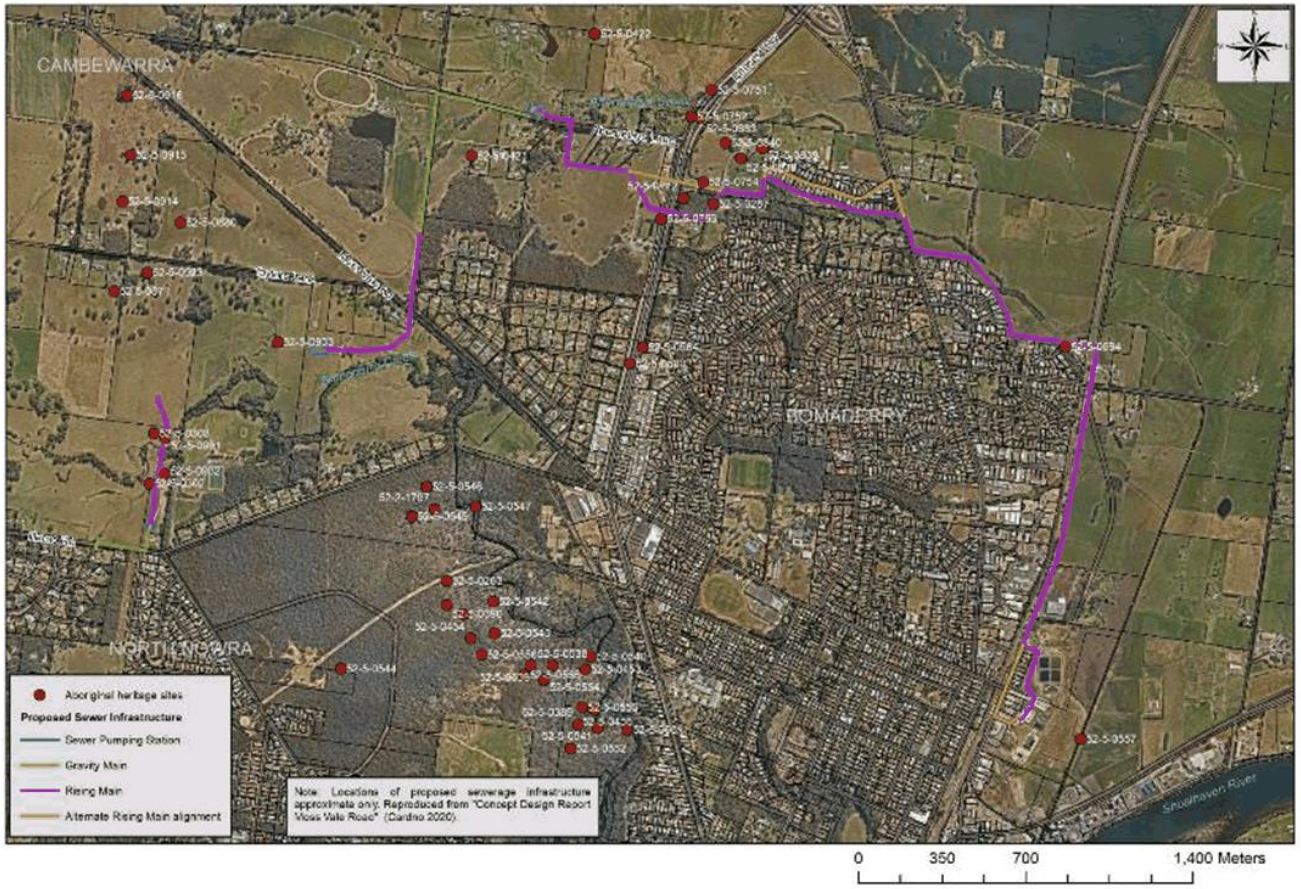
Areas surrounding and in close proximity to the site have been the subject of numerous Aboriginal heritage investigations, including those associated with development of the Princes Highway, the Eastern Gas Pipeline, the Moss Vale Urban Release Areas and the Far North Collector Road. A number of recorded Aboriginal heritage sites are known to occur in proximity to the site as a result of these studies.

Additionally, the site contains landscape features that are regarded as indicating a higher potential for Aboriginal objects, namely:

- Located within 200m of waters,

In accordance with the Due Diligence Guidelines (DECCW 2010), a search on the Aboriginal Heritage Information Management System (AHIMS) on 07 October 2020 indicated that there are at least 39 recorded Aboriginal sites or places, occurring within the locality of proposal (refer to AHIMS extensive report in Appendix C). These sites are mapped in Figure 8 and include records

Figure 8. Locations of recorded Aboriginal heritage sites in proximity to proposed works



that are not in close proximity to the site (e.g. within Bomaderry Creek Nature Reserve) and therefore do not require further consideration.

Table 3 presents the Aboriginal heritage records occurring in close proximity to the proposed works (within 200m) and requiring further assessment as to whether the current proposal poses risk of impact. Site descriptions were obtained from AHIMS site cards acquired in association with extensive search. Map locations from available site cards and reports are presented for relevant sites in Appendix D.

Table 3. Aboriginal heritage records in close proximity to the site

Site reference	Coordinates	Description	Risk of impact
52-5-0287	AGD84 E280360 N6142800	Artefact – open camp site - Abernethys Creek. Scattered artefacts recorded on north facing hill side adjacent to valley floor of minor tributary by K.Officer (NOCH) during investigations for proposed housing subdivision.	**Possible**. The coordinates place the site in close proximity to a rising main alignment. The site description from site card suggests the landscape has been modified since the 1994 record and makes the location difficult to determine. The report associated with the 1994 investigation is not available. Subsequent reports by NOCH (e.g. Navin Officer Heritage Consultants 2013) covering the area, refer to the site but do not add to the description or offer a location map to more clearly define the site location.
52-5-0302	AGD84 E278000 N6141630	Tapitallee (Bomaderry) Creek – low density subsurface artefact scatter between 7cm and 30cm deep, recorded on low creek terrace adjacent to permanent creek by M.Barber & D.Williams during investigations for fibre optic cable installation. Additional artefact recorded by S.Wickman between original site and Tapitallee Creek, during investigations for Eastern Gas Pipeline.	**Possible**. The coordinates and site description place the site at approx. 30m west of the proposed rising main alignment, running north from the New SPS21. The site description however, suggests vaguely that the site may be up to 200sq.m, potentially placing the site within the footprint of the proposed works.
52-5-0303	AGD84 E278020 N6141840	Tapitallee (Bomaderry) Creek – two subsurface artefacts 150m apart each at no greater than 10cm deep, recorded on low creek terrace adjacent to permanent creek by M.Barber & D.Williams during investigations for fibre optic cable installation. A single additional artefact at 11-20cm deep recorded by S.Huys between original site and Tapitallee Creek, during	**Possible**. The coordinates and site description place the site at approx. 47m west of the proposed rising main alignment, running north from the New SPS21. The site description however, suggests vaguely that the site extends for 150m, potentially placing the site within the footprint of the proposed works.

Site reference	Coordinates	Description	Risk of impact
		investigations for Eastern Gas Pipeline.	
52-5-0421	AGD84 E279350 N6143000	Artefact scatter recorded approximately 80 metres from Bells Lane along the easement by S.Wickman during investigations for the Eastern Gas Pipeline.	None. Sewer pipe alignment would be on the west side of Bells Lane and then running east within Abernethys Lane.
52-5-0557	AGD84 E281896 N6140560	Canyon shelter – description places site in Bomaderry Creek gorge.	None. Heritage site does not occur in close proximity to the proposed works. Coordinates were incorrectly recorded.
52-5-0694	GDA94 E281938 N6142393	Artefact – Edwards Ave. A single artefact located beneath a tree on a small patch of exposure within one metre to the north of an east-west running property boundary fence in Bomaderry. Approximately 30 metres to the ENE of the northwestern end of Roseville Road; and 40 metres to the south of Abernethys Creek. J.Symons during investigations for the Sewer Pump Station works.	**Low**. The remains of the tree are visible, occurring on the southern side of the fence. The proposed rising main alignment would occur approx. 5m on the north side of the fence. The heritage site shall be located and identified with hi-visibility para-webbing or similar to avoid potential impact during works.
52-5-0712	GDA94 E280341 N6143016	PASA 52 – Identified during investigations into the Berry to Bomaderry Princes Hwy upgrade by A.Cressey (Navin Officer Heritage Consultancy). PASA extents both east and west of the current Princes highway alignment, adjacent to Abernethys creek, 200m south of Abernethys Lane likely having a low artefact incidence on this landform, indicated by adjacent site 52-5-0287. Excavations at PASA52 confirmed the presence of subsurface Aboriginal artefacts. These artefacts were located in two areas, now identified as Aboriginal sites G2B A61, as well as an extension of existing site Abernethy's Creek 1. Site G2B A61 had a low density of artefacts resulting in its	Potential Archaeological Sensitive Area (PASA). Refer to PAD "G2B A61" and PAD "Abernethys Creek" below.

Site reference	Coordinates	Description	Risk of impact
		archaeological significance being assessed as low - at the local level. No further works have been recommended for this site prior to construction impacts. Abernethy's Creek 1 was assessed to be of moderate local archaeological significance given the previous presence of surface artefacts at this site, as well as the subsurface artefact uncovered during these excavations. No further works have been recommended for this site prior to construction impacts, due to the fact that no artefacts were uncovered within the area of impact from the project.	
52-5-0753	GDA94 E280248 N6142928	PAD "G2B A61" – Identified during investigations into the Berry to Bomaderry Princes Hwy upgrade by A.Cressey (Navin Officer Heritage Consultancy). Archaeological significance of site assessed as low at local level due to low artefact density of subsurface archaeological deposits. A single artefact found at one location out of eight test pits.	**Low**. Potential Archaeological Deposit (PAD) within which, comprehensive test pitting was undertaken. Rising main alignment would pass approx. 37m to the north of the site, which appears to have been destroyed by the Princes Hwy upgrade under Permit 3791.
52-5-0754	GDA94 E280423 N6143083	PAD "Abernethys Creek" – Identified during investigations into the Berry to Bomaderry Princes Hwy upgrade by A.Cressey (Navin Officer Heritage Consultancy). Was considered moderate archaeological significance at local level, but of less research potential than other sites situated on similar landforms within the study area.	**Possible.** Potential Archaeological Deposit (PAD) within which, little test pitting has been undertaken. Site record 52-5-0287 occurs in this area.
52-5-0838	GDA94 E280581 N6143181	Artefacts. Two surface artefacts, no subsurface artefacts (Biosis 2016).	None. Heritage site occurs on northern side of Abernethys Creek at least 110 to 140m from proposed works.

Site reference	Coordinates	Description	Risk of impact
52-5-0839	GDA94 E280671 N6143226	Artefacts – subsurface artefact scatter recorded on C130 Princes Hwy across crest landform ~15m from tree-line in north-eastern paddock from house by J.Cole (Biosis) during investigation for residential subdivision.	None. Heritage site occurs on northern side of Abernethys Creek approx. 90m north of proposed works.
52-5-0840	GDA94 E280517 N6143246	Artefacts – subsurface artefact scatter recorded on C130 Princes Hwy across crest landform ~10m from tree-line in north-western paddock from house by J.Cole (Biosis) during investigation for residential subdivision.	None. Heritage site occurs on northern side of Abernethys Creek approx. 198m north of proposed works.
52-5-0931	GDA94 E278174 N6142011	Artefact – Bomaderry Creek. Low density, sub-surface artefact scatters at 10-30cm deep, recorded during archaeological investigations for the proposed FNCR by S. Feary (2019).	**Possible**. The proposed rising main running north from New SPS21, would pass in close proximity to the record (within 5m) which represents four test pits with low-density sub-surface artefact scatters at 10-30cm deep. At the time of works the artefacts would be covered by the Far North Collector Road (subject to approval of current AHIP application for Far North Collector Road) with the proposed rising main parallel to the western side of the road. The very close proximity however, creates a risk of impact.
52-5-0932	GDA94 E278172 N6141863	Artefact – Bomaderry Creek. Low density, sub-surface artefact scatters at 10-30cm deep, recorded during archaeological investigations for the proposed FNCR by S. Feary (2019).	**Possible (low likelihood)**. Rising main running north from New SPS21, at the time of works the artefact would be covered by the Far North Collector Road (subject to approval of current AHIP application for Far North Collector Road). The proposed rising main would run parallel to the western side of the road, at least 25m from the record and therefore be unlikely to impact the heritage site.
52-5-0933	GDA94 E278645 N6142413	Artefact – Paleochannel. Low density, sub-surface artefact scatters at 10-30cm deep, recorded during archaeological investigations for the proposed FNCR by S. Feary (2019).	None. Site occurs outside of works footprint, at least 140m west of proposed MVRS SPS.

In consideration of the potential for Aboriginal heritage within the footprint of the proposed infrastructure works, consultant archaeologist Dr Sue Feary was engaged by Council to undertake an Aboriginal cultural heritage due diligence assessment (Feary 2020) and provide recommendations for mitigation.

Feary identified areas of archaeological potential with consideration of landscape position, proximity to water, landform and level of disturbance, assigning a rating of very low, low or medium potential for each survey unit assessed (refer to Table 4, Feary 2020). Most of the areas identified as having archaeological potential have been avoided through redesign of the infrastructure alignments.

The survey unit areas considered by Feary to have a medium potential for archaeological potential where conflict remains with the current design alignment includes:

- Survey Unit 13: Pressure main from SPS08 to Princes Hwy (low flat terraces associated with Abernethys Creek)
- Survey Unit 16: North Nowra Diversion (Bomaderry Creek / Tapitallee Creek terraces and flats in the vicinity of the future Far North Collector Road bridge)

In the vicinity of Survey Unit 13, impact to known and potentially occurring artefacts shall be avoided through design refinement and construction methodology (refer to Section 3.4.1).

In the vicinity of Survey Unit 16, site constraints and uncertainty regarding the extent of heritage items limit the ability to ensure avoidance of known and potentially occurring artefacts. It is considered that impact to Aboriginal artefacts in this area cannot be avoided and that an Aboriginal Heritage Impact Permit (AHIP) will be required.

An existing AHIP application and associated Aboriginal Cultural Heritage Assessment Report (ACHAR) by Sue Feary (2019), for impact to sites along the proposed Far North Collector Road alignment (including sites 52-5-0302, 52-5-0303, 52-5-0931, 52-5-0932) is currently being revised to include potential impacts to these sites associated with the current sewerage infrastructure proposal.

3.4.1 Mitigation of impacts to known Aboriginal heritage sites and sensitive areas

Potential for impact to a number of Aboriginal heritage sites and sensitive areas as a result of the proposed sewage infrastructure works has been identified.

Recommended options for mitigation (from Feary 2020) include the following:

> *1. Redesign the proposal to ensure the locations of all previously recorded sites are not impacted, and proceed with caution. Works must cease if objects are encountered during development.*
>
> Note: The sites have no visible expression as there is no ground visibility and they are mostly subsurface artefacts which have since been removed. Avoidance will be based on grid coordinates with a 5 metre buffer or by underboring to a depth no less than 400 mm.

Justification for this option arises from the considerable amount of archaeological investigation in the north Nowra region that has demonstrated the presence of a very low density of stone artefacts across the landscape, most buried by post-European sediment deposition. Sites tend to be associated with present and prior drainage lines. Even intensive test pitting has revealed only very small amounts of archaeological material.

It could be argued that sufficient test pitting has been done and that any further test pitting would be unlikely to contribute any new information and therefore would not be in accordance with Section 3.1 of the OEH code of practice, viz.

> Archaeological test excavation will be necessary when it can be demonstrated ….that sub-surface Aboriginal objects with potential conservation value have a high probability of being present in an area, and the area cannot be substantially avoided by the proposed activity. The test excavations permitted by this Code are limited in their scope as described below. The first priority in test excavations, and recording Aboriginal objects during test excavations, must always be to avoid or minimise, as far practicable, the risk of harm to the objects under investigation.

2. As above but additionally, avoid areas specified in this report as having medium archaeological potential. This reduces the risk of encountering objects during construction. In this instance, avoidance includes the technique of underboring to a depth no less than 400 mm.

The basis for this option is that the development may impact subsurface artefacts, most likely within areas identified as having archaeological potential, given the known nature and extent of the archaeological evidence. The basis for not undertaking any additional investigation such as test pitting is that there has already been a considerable amount of test pitting across the same landforms affected by the proposed development, leading to a loss of the physical heritage. Without exception these have produced low numbers of artefacts, whose analysis has so far not changed the models of pre-contact Aboriginal occupation and use developed in 2007.

3. Undertake a test excavation program at some or all of the locations identified in Table 4 of this report, using the methodology outlined in Appendix 3 and either seek an AHIP or underbore any sites that are found.

Locations and numbers of test excavations should be refined by prior careful field checking of all locations. Landforms previously unsurveyed, such as those in the northwest of the study area should have higher priority as they may reveal new information. SU10, adjacent to Bomaderry Creek is also a priority due to the large numbers of sites found further downstream. Table 4 assigns priorities to areas of archaeological potential.

4. Combine Options 2 and 3 and conduct test excavations at high priority locations only. Remaining locations of archaeological potential could be underbored.

This is the preferred option of the consultant archaeologist as it maximizes return of useful information for test excavation effort and avoids damage to the remaining areas of archaeological potential.

Redesign of the proposal to avoid previously recorded sites and sensitive areas has been undertaken as far practical and achieves avoidance of most areas.

Recommended mitigation measures are presented for the remaining sites and areas to minimise risk of impact and ensure compliance with the *National Parks and Wildlife Act 1974*.

Sites 52-5-0287 and 52-5-0754

52-5-0287 (AGD84: E280360 N6142800) and 52-5-0754 (GDA94: E280423 N6143083) are both associated with Abernethys Creek, occurring east of the Princes Highway, following the depression in the landscape associated with Abernethys Creek, to the south of Emerald Drive. The area was identified as a Potential Archaeological Deposit and was confirmed by Feary (2020) as an area of archaeological potential.

Given the somewhat ambiguous nature of the records, precise identification to ensure avoidance of these sites is not possible.

Under-boring to a depth no less than 400 mm, is proposed through the area covered by the "Abernethys Creek" PAD (52-5-0754) to avoid impact to this area and ensure avoidance of site 52-5-0287 (refer to Figures 9 and 10). Under-boring is already proposed for the low flat terrace area associated with Abernethys Creek east of Meroo Rd where the alignment deviates away from existing disturbed and modified landforms. The area parallel to the southern side of Emerald Drive is disturbed and modified, in addition to forming part of the drainage line, which Feary (2020) notes would have no potential for containing Aboriginal sites. Under-boring shall involve monitoring of excavation for entry and exit pits where required, by Nowra Aboriginal Land Council Aboriginal Heritage Site Officers.

Figure 9. Location of "Abernethys Creek" PAD (from Navin Officer Heritage Consultants 2013)

Figure 10. Proposed under-boring area to avoid impact to Aboriginal sites associated with Abernethys Creek (PADs reproduced from Navin Officer Heritage Consultants 2013)

Site 52-5-0694

52-5-0694 (GDA94: E281938 N6142393) refers to a single artefact in the vicinity of SPS08 off Roseville Rd (near Edwards Avenue).

The remains of the tree where the artefact was located are visible, occurring on the southern side of the fence. The proposed rising main alignment would occur approx. 5m on the north side of the fence.

It is recommended that this heritage site shall be located and identified with hi-visibility para-webbing or similar to avoid potential impact during works.

Site 52-5-0753

52-5-0753 (GDA94: E280248 N6142928) refers to PAD "G2B A61" identified during investigations into the Berry to Bomaderry Princes Hwy (refer to Figure 10 above).

It is recommended that this heritage site shall be located and identified with hi-visibility para-webbing or similar to avoid potential impact during works.

3.5 Non-indigenous heritage

No items of local heritage significance or any items on the State Heritage Register or listed in the Shoalhaven Local Environmental Plan occur in close proximity to the site such that the proposed works might impact them.

3.6 Flood liable land

Land within the site associated with Bomaderry Creek and the lower Shoalhaven River floodplain is mapped as being flood liable (refer to Figure 11).

Consultation with the Council's Floodplain Engineer team occurred during the design development phase.

With regard to the construction of subsurface sewer infrastructure, i.e. the rising and gravity mains, it is considered that the proposal will not change flood patterns or local flood behaviour, or lead to an increased risk associated with flooding.

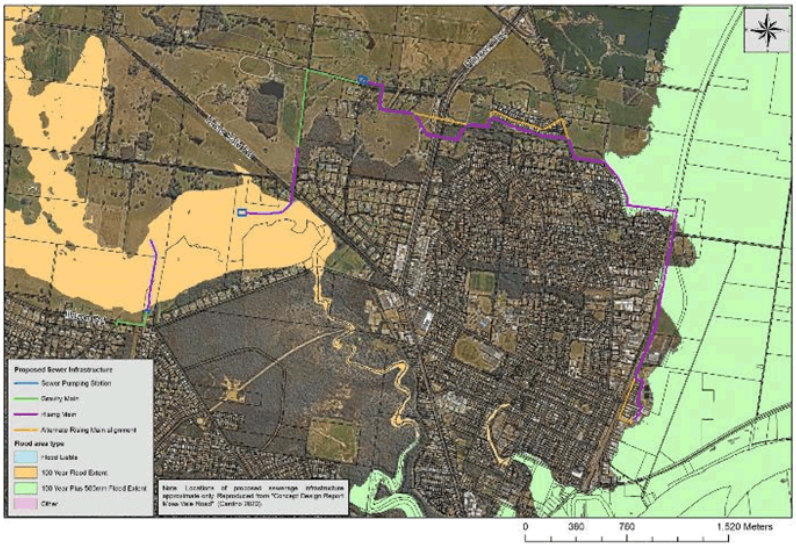
With regard to the proposed sewer pump stations, two (New SPS21 and MVRN SPS) occur outside the mapped areas of flood liable land.

Rhelm (2018) mapped high hazard floodway associated with Abernethys Creek occurring in close proximity to the MVRN SPS site and a broad floodway (at 1% AEP) covering much of the unformed section of Abernethys Rd which would provide access from Bells Lane. Shoalwater has considered and accepts that access to the SPS during flood events may be restricted and notes that this would not affect operations during such times.

The proposed MVRS SPS occurs within mapped flood liable land. Consultation under Part 2, Division 1 of the Infrastructure SEPP is therefore required for this structure.

The project was referred to Council's Senior Floodplain Officer for review on 19 October 2020 (D20/456942), a follow-up referral was submitted on 22 December 2020 (D20/564201). Comments and recommendations are expected in January 2021. Recommendations shall be incorporated and further consultation with Council's Floodplain Engineers shall occur during the detailed design phase for all proposed works in flood liable areas.

Figure 11. Flood liable land in proximity to the site



3.7 Riparian corridors

The site contains a number of riparian corridors associated with Bomaderry Creek and Abernethys Creek (refer to Figure 12).

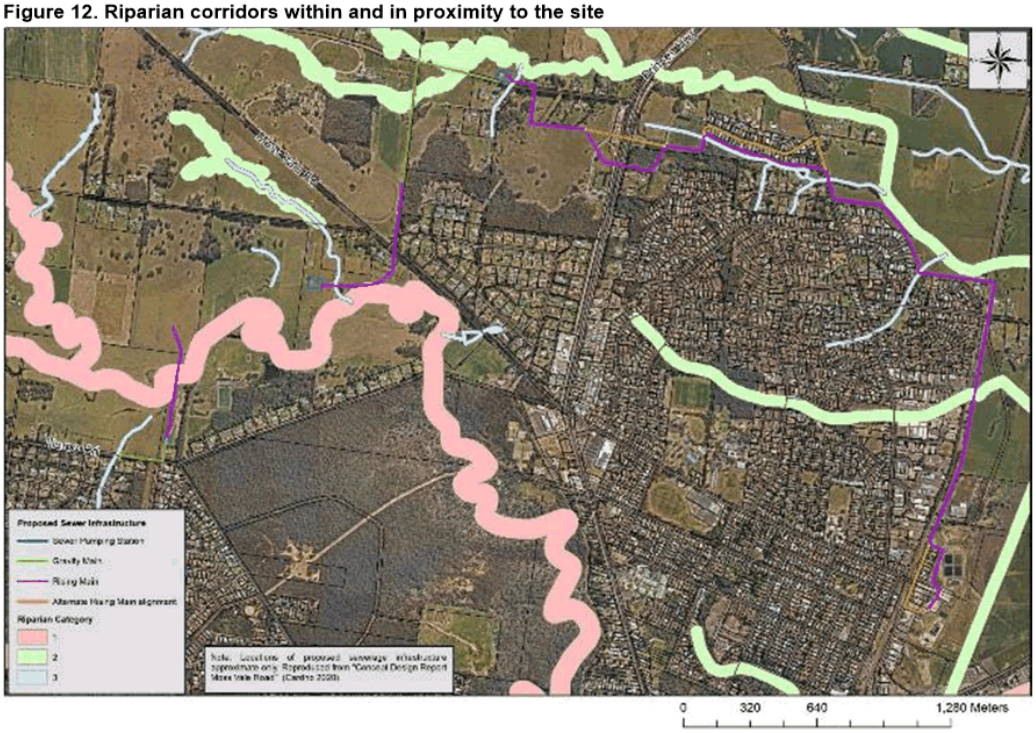
The proposal would not involve removal of trees or significant vegetation from the banks of any creeks or elsewhere within the riparian corridors.

In most instances where the alignment of rising or gravity mains would intersect a waterway, under-boring would be utilised to avoid disturbance to the riparian corridor. The only exceptions to this are Bomaderry Creek north of New SPS21 where the rising main would be attached to the side of the Far North Collector bridge and Bells Lane where the watercourse associated with the Category 2 riparian corridor is poorly defined, open grassed swale within paddocks, and containing no treed vegetation.

Works would therefore not compromise the integrity of creek banks, nor the function of any riparian corridor in providing habitat connectivity.

Erosion and sediment controls would be installed to manage potential erosion where works occur in the vicinity of creeks and watercourses.

Figure 12. Riparian corridors within and in proximity to the site



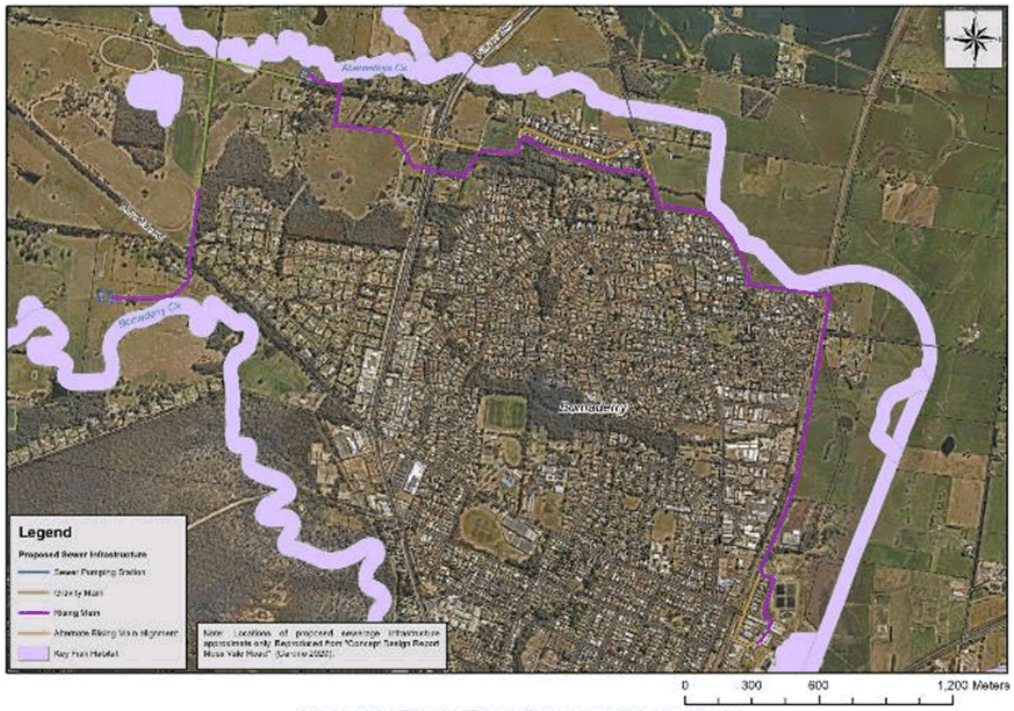
3.8 Key Fish Habitat

Key Fish Habitat, mapped for the purpose of the *Fisheries Management Act 1994* occurs within and in close proximity to the site as shown in Figure 13 below.

Excavation within a watercourse mapped as Key Fish Habitat would only occur for the construction of an all-weather access track to MVRN SPS from the intersection of Bells Lane and Abernethys Lane to the SPS site along the road reserve, where the culvert bridging of a minor watercourse associated with Abernethys Creek would be required.

A Fisheries Permit will be required for this component of the project.

Figure 13. Key Fish Habitat mapped as occurring in proximity to the site



Moss Vale Road URAs - Sewerage Infrastructure

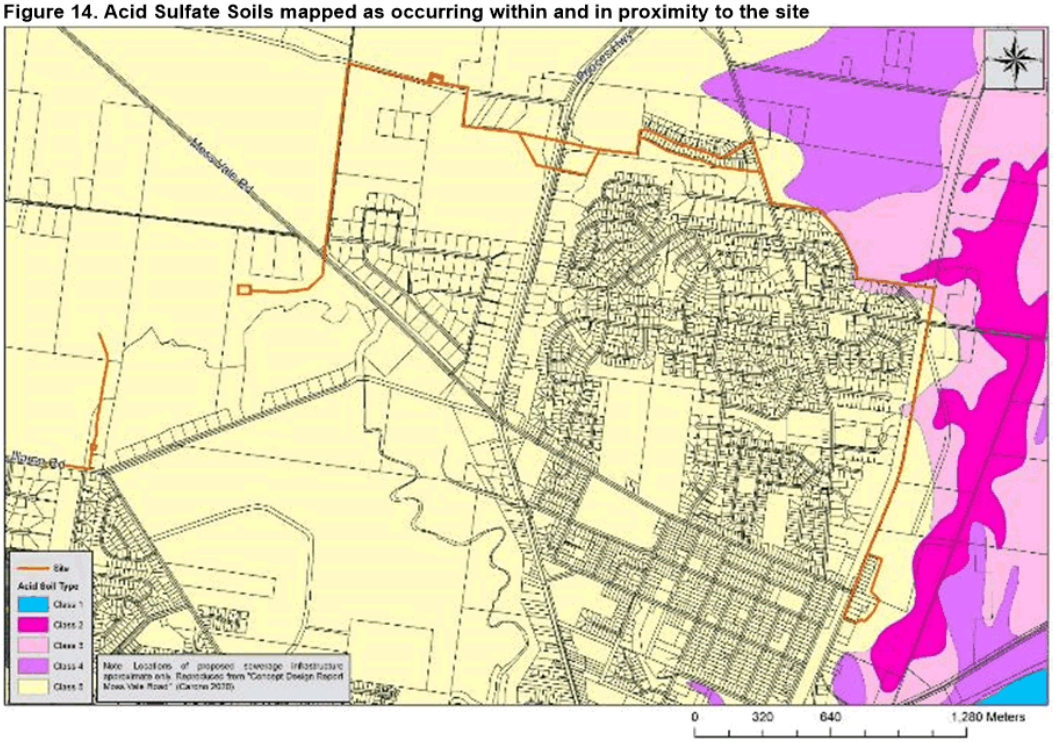
3.9 Acid Sulfate Soils

Most of the site is mapped as Class 5 Acid Sulfate Soils. On the eastern and north-eastern edges, between Meroo Rd and Railway St in the vicinity of Abernethys Creek, the rising main alignment would cross areas mapped as Class 4 and Class 3 Acid Sulfate Soils.

The *Shoalhaven Local Environment Plan 2014* indicates that a risk of A.S.S exposure exists for Class 4 A.S.S where works would occur more than 2m below the natural ground surface, or where works would involve lowering of the watertable more than 2m below the ground surface. A risk of A.S.S exposure exists for Class 3 A.S.S where works would occur more than 1m below the natural ground surface, or where works would involve lowering of the watertable more than 1m below the ground surface.

From Chainage 2400 to 3250 in Class 3 and Class 4 A.S.S., depth of excavation would range from 0.93 to 3.37m (frequently greater than 2m) and from Chainage 3700 to 3800 in Class 3 A.S.S, depth of excavation would be 1.35m. In these areas, sampling and analysis will be required to determine the need for an Acid Sulfate Soil Management Plan and inform the plan if management and treatment of excavated soil is required.

Figure 14. Acid Sulfate Soils mapped as occurring within and in proximity to the site



3.10 EP&A Regulation – Clause 228 matters of consideration

Clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* lists the factors to be taken into account when consideration is being given to the likely impact of an activity on the environment under Part 5 of the EP&A Act. The following assessment in Table 5 deals with each of the factors in relation to the proposed activity.

Table 5. Clause 228 Matters of consideration

Does the proposal:	Assessment	Reason
a) Have any environmental impact on a community?	Positive	The proposal is to construct sewer infrastructure to facilitate provision of sewage services to the Moss Vale Road urban release areas. The proposal has been designed to align with existing cleared and disturbed areas to every practical extent, to have minimal risk of impact to Aboriginal cultural heritage and sensitive environmental areas, requiring minimal vegetation clearing, and minimal disturbance to watercourses and riparian corridors. The proposed activity would not have any impact on other community services and infrastructure such as water, waste management, educational, medical or social services.
b) Cause any transformation of a locality?	Low adverse	The proposal would result in the construction of three sewer pump stations within land formerly of agricultural use. The location of these pump stations will be preceded by the development of Far North Collector Road and will be associated with the future development of the Moss Vale Road Urban Release Areas however. In this context, the impact on the locality of the current proposal will be negligible. The locality's current use would otherwise remain unchanged. The rising and gravity mains would be subsurface except where attached to the side of the Far North Collector – Bomaderry Creek bridge. Valves would be unobtrusive. Vegetation removal would be minimal and primarily in previously cleared and modified areas.
c) Have any environmental impact on the	Low adverse	The five-part test of significance (Section 3.2) concludes that the proposed activity would not have a significant impact upon endangered ecological communities.

ecosystem of the locality?		No hollow-bearing trees, threatened flora species, rocky outcrops, caves or water bodies would be removed or otherwise impacted. No food resources critical to the survival of a particular species would be removed. Aquatic ecosystems are not likely to be affected by the proposed activity and there is not likely to be any long-term or long-lasting impact through the input of sediment and nutrient into the ecosystem (refer to Section 3.1) Environmental safeguards and mitigation measures (Section 6) would be employed to minimise risk of impacts.
d) Cause a diminution of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	Low adverse	Impact to the recreational, scientific and environmental values of the site would be negligible. Impact to the aesthetic values of the locality would be negligible for subsurface mains. The construction of the sewer pump stations may detract from the aesthetics of the current rural locality, but in the context of the development of the Far North Collector Road and Moss Vale URAs, this would be minor.
e) Have any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific, or social significance or other special value for present or future generations?	Low adverse	The site of the proposed activity has no significant aesthetic, architectural, cultural, historical or scientific values. As such, the proposed activity would have no significant impact on these items. No items in the vicinity of the work site which are listed on the State Heritage Register and the Shoalhaven Local environmental Plan would be impacted by the proposal. The site is not within an Aboriginal Place declared under the *National Parks and Wildlife Act 1974*. In accordance with the NSW Department of Environment, Climate Change and Water's Due Diligence Code of Practice, the proposed activity would either avoid potential harm to Aboriginal heritage sites, or where impossible to avoid, would be undertaken in accordance with an Aboriginal Heritage Impact Permit.
f) Have any impact on the habitat of protected fauna (within the meaning of the Biodiversity	Low adverse	No important habitat would be removed or otherwise impacted as part of the proposal. Habitat corridors would not be severed. Barriers to fauna movement and new threats to fauna would not be introduced. Mitigation measures (Section 6) will reduce risks further.

Conservation Act 2016)?		
g) Cause any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?	Low adverse	The five-part test of significance, provided in Section 3.2 above, concludes that the proposed activity would not have a significant impact upon threatened fauna. No potentially important habitat or food resources for locally occurring threatened species would be removed or otherwise impacted by the proposal. No hollow-bearing trees, threatened flora species, rocky outcrops, caves, crevices or water bodies would be removed or otherwise impacted. No food resources critical to the survival of a particular species would be removed.
h) Have any long-term effects on the environment?	Negligible	The proposed activity would not use hazardous substances or use or generate chemicals which may build up residues in the environment. SPS overflows would be managed in accordance with an EPA licence and would disperse any overflow to a grassed/vegetated swale to minimise wastewater impact to waterways. Minimal maintenance corridors (approx. 5m wide) would be retained long-term, but these are primarily in areas where vegetation growth is prevented (e.g. roadsides and existing cleared areas) and would not affect the potential for future significant habitat.
i) Cause any degradation of the quality of the environment?	Low-adverse	The environmental safeguards (Section 6) to be undertaken would minimise impacts and risks to the quality of the environment. No significant habitat would be removed or otherwise impacted. Works would be undertaken almost entirely through previously cleared and modified land. The proposal would not intentionally introduce noxious weeds, vermin, or feral animals into the area or contaminate the soil.
j) Cause any risk to the safety of the environment?	Negligible	The proposal would involve trenching across relatively flat land and under-boring to avoid impacts to waterways and riparian corridors.

		Excavation within the watercourse for creation of access to MVRN SPS would be in accordance with a Fisheries Permit and would involve sediment and erosion controls in accordance with the "Blue Book".
k) Cause any reduction in the range of beneficial uses of the environment?	Negligible	The site and local environment will remain relatively unchanged. The footprint of the sewer pump stations in the context of the site and the locality is negligible.
l) Cause any pollution of the environment?	Low adverse	The proposal would involve a temporary and local generation of noise. However, this is not anticipated to negatively affect any sensitive receivers such as schools, childcare centres and hospitals. It is unlikely that the activity (including the environmental impact mitigation measures) would result in spillages, dust, odours, vibration or radiation. The proposal does not involve the use, storage or transportation of hazardous substances or the use or generation of chemicals which may build up residues in the environment. SPS overflows would be managed in accordance with an EPA licence and would disperse any overflow to a grassed/vegetated swale to minimise wastewater impact to waterways.
m) Have any environmental problems associated with the disposal of waste?	Low adverse	The project would facilitate provision of wastewater disposal and treatment services for the Moss Vale URAs. SPS overflows would be managed in accordance with an EPA licence.
n) Cause any increased demands on resources (natural or otherwise) which are, or are likely to become, in short supply?	Low adverse	The amount of resources that would be used are not considered significant and would not increase demands on current resources such that they would become in short supply.

o) Have any cumulative environmental effect with other existing or likely future activities?	Low adverse	The assessed low adverse or negligible impacts of the proposal are not likely to interact. The low adverse impacts to water quality as a result of this project may contribute to cumulative water quality degradation in Bomaderry Creek and Abernethys Creek, in conjunction with development of the Far North Collector Road and Moss Vale Urban Release Areas. Mitigation measures (Section 6) including utilisation shall be implemented to minimise the risk of cumulative environmental effects. Future development associated with the URAs will involve further vegetation clearing with associated environmental assessment. The current proposal would not affect any habitat corridor or reduce any significant vegetation.
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	Low adverse	The proposed activity would have no effect on coastal processes including those projected under climate change conditions. The site of the proposal is not located in an identified coastal hazard area.

4. PERMISSIBILITY

Section 4.1 (Development that does not need consent) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) states that:

> *"If an environmental planning instrument provides that specified development may be carried out without the need for development consent, a person may carry the development out, in accordance with the instrument, on land to which the provision applies."*

In this regard, clause 106(3B) of the NSW *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) provides that:

> *Development for the purpose of sewage reticulation systems may be carried out without consent on any land in the prescribed circumstances.*

Where:
*(1) Development is carried out in the **prescribed circumstances** if the development—*
(a) is carried out by or on behalf of a public authority,

As the proposal does not require development consent, and as it constitutes an 'activity' for the purposes of Part 5 of the EP&A Act, being carried out by (or on behalf of) a public authority, environmental assessment under Part 5 of the EP&A Act is required. This REF provides this assessment.

A summary of other relevant legislation and permissibility is provided in Table 7 below.

Table 7. Summary of other relevant legislation and permissibility

NSW STATE LEGISLATION
***Environmental Planning and Assessment Act 1979* (EP&A Act)**
Permissible √ Not permissible ☐
Justification: The Infrastructure SEPP provides for the proposed works to be undertaken without development consent (refer above). In circumstances where development consent is not required, the environmental assessment provisions outlined in Part 5 of the Act are required to be complied with. This REF fulfils this requirement.
Shoalhaven Local Environmental Plan 2014 (SLEP)
Permissible √ Not permissible ☐
Justification:

Under the SLEP the proposed activity may have required development consent. The provisions of SEPP Infrastructure, however, prevail over the SLEP where there is an inconsistency by virtue of Section 3.28 of the EP&A Act. Consequently, development consent is not required.
State Environmental Planning Policy (Coastal Management) 2018
Permissible √ Not permissible ☐
Justification: The proposed activity would be undertaken within an area which is not mapped for the purpose of the SEPP.
State Environmental Planning Policy (Koala Habitat Protection) 2019
Permissible √ Not permissible ☐
Justification: Development control provisions of the SEPP apply only in relation to a development application (Part 2 of the SEPP). The proposal would not remove or otherwise impact habitat that Koalas are likely to rely on.
Wilderness Act 1987
Permissible √ Not permissible ☐
Justification: The proposed activity is not located within a wilderness area declared under this Act.
Protection of the Environment Operations Act 1997
Permissible under licence √ Not permissible ☐
Justification: The pollution of waters with prescribed matter (including excreta, manure or urine, or any waste from an on-site human waste storage facility or treatment device or any matter that contains faecal coliform or faecal streptococci, as per (f) of Schedule 5) is prohibited under S120 of the Act. Sewage treatment (including reticulation systems) also qualifies as a scheduled activity under S36, where the capacity exceeds 2,500 persons equivalent or 750KL per day, whichever is greater. The current proposal provides for 900 residential lots in Moss Vale Rd South URA and 2500 residential lots in Moss Vale Rd North URA, therefore exceeding the limit.

Operation of the system and regulation of water pollution must therefore be in accordance with an environment protection licence under Chapter 3 of the Act.
***National Parks and Wildlife Act 1974* (NP&W Act)**
Permissible √ Not permissible ☐
Justification: • The proposed activity would not encroach into National Park estate. • The Act provides the basis for the legal protection and management of Aboriginal sites in NSW. Under Sections 86 and 90 of the Act it is an offence to disturb an Aboriginal object or knowlingly destroy or damage, or cause the destruction or damage to, an Aboriginal object or place, except in accordance with a permit of consent under section 87 and 90 of the Act. • **Known sites shall be avoided or if harm unavoidable, shall be in accordance with an approved AHIP**
Fisheries Management Act 1994
Permissible under Permit √ Not permissible ☐
Justification: The proposed activity: • would not affect declared aquatic reserves (Part 7, Division 2 of the Act); • would involve dredging or reclamation (Part 7, Division 3). Excavation within a watercourse mapped as Key Fish Habitat would be required to construct access to MVRN SPS along the unformed section of Abernethys Lane from Bells Lane. • would not involve blocking the passage of fish (s.219); • would not impact mangroves and marine vegetation (Part 7, Division 4); • would not involve disturbance to gravel beds where salmon or trout spawn (s.208 of the Act); • does not involve the release of live fish (Part 7, Division 7); • does not involve the construction of dams and weirs (s.218); • would not result in the blocking of the passage of fish; • would not impact declared threatened species of endangered ecological communities (Part 7A); • does not constitute a declared key threatening process (Part 7A); and • would not use explosives in a watercourse (Clauses 70 and 71 of the *Fisheries Management (General) Regulation 2019).* A Fisheries Permit is therefore required for works within the watercourse associated with construction of access to MVRN SPS.
Heritage Act 1977

Permissible √ Not permissible ☐
Justification: • The proposed activity would not disturb an item of state heritage significance. • The Act also provides statutory protection to relics, archaeological deposits, artefacts or deposits. Section 139 to 146 of the Act require that excavation that is likely to contain, or is believed may contain, archaeological relics is undertaken in accordance with an excavation permit issued by the Heritage Council. The Act defines an archaeological relic as "*any deposit, artefact, object or material evidence that:* *a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement; or* b) *is of state and local heritage significance"* As the site has little to no archaeological potential, a permit is not required.
Biodiversity Conservation Act 2016
Permissible √ Not permissible ☐
Justification: • The proposed activity is unlikely to have a significant impact on species and communities listed in the schedules of the Act (refer to Section 3.2). • The proposed development is not within an area declared to be of "outstanding biodiversity value" as defined in the Act. • The design and mitigation measures (Section 6) would ensure that no *serious and irreversible impacts on biodiverstiy values* (as defined by the BC Act) occur at the site of the proposed activity. The proposed activity therefore is not deemed to be *likely to significantly affect threatened species* and an environmental impact statement (EIS) or a Biodiversity Development Assessment Report (BDAR) is not required. It is also a defence to a prosecution for an offence under Part 2 of the Act (harming animals, picking plants, damaging the habitat of threatened species or ecological communities *etc*) if the work was essential for the carrying out of an activity by a determining authority within the meaning of Part 5 of the Environmental Planning and Assessment Act 1979 after compliance with that Part. The activity will not remove vegetation that is listed under Schedule 1 Threatened Species, Schedule 2 Threatened ecological communities and Schedule 6 Protected Plants. Therefore the activity is considered permissible as this REF has been prepared and determined in accordance with the EP&A Act.

Water Management Act 2000
Permissible √ Not permissible ☐
Justification: • Local councils are exempt from s.91E(1) of the Act in relation to all controlled activites that they carry out in, on or under waterfront land (by virtue of clause 41 of the *Water Management (General) Regulation 2018*. • The proposal would not interfere with the aquifer and therefore an interference licence is not required (s.91F).
COMMONWEALTH LEGISLATION
Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EP&BC Act)
Permissible √ Not permissible ☐
Justification: The proposed activity would not be undertaken on Commonwealth land and no matters of National Environmental Significance are likely to be significantly impacted by the proposed activity (Section 3.3). The proposed activity is therefore not a controlled action and does not require commonwealth referral.
Commonwealth *Native Title Act 1993*
Permissible √ Not permissible ☐
Justification: All affected land comprises freehold land or road reserves for which Council is the authority (refer to Section 1.3). Native Title has therefore been extinguished as a Previous Exclusive Possession Act – Freehold Title (Section 23B). Consultation or approval from native title claimants is therefore not required.

5. CONSULTATION

5.1 Infrastructure SEPP

Clause 13 – Development with impacts on council-related infrastructure or services

In consideration of the consultation requirements specified under Clause 13 of the Infrastructure SEPP, the proponent, Shoalhaven Water, is the also the party responsible for considering the impact of the proposal on the capacity of the sewerage system. No impacts to stormwater management systems, traffic generation, water use, public places, nor excavation of footpaths or road surfaces would occur. Consultation under Section 13 is therefore not required.

Clause 14 – Development with impacts on local heritage

No impacts to any local heritage item would occur. Consultation under Clause 14 is therefore not required.

Clause 15 – Development with impacts on flood liable land

With regard to the construction of subsurface sewer infrastructure, i.e. the rising and gravity mains, it is considered that the proposal will not change flood patterns or local flood behaviour, or lead to an increased risk associated with flooding.

With regard to the proposed sewer pump stations, two (New SPS21 and MVRN SPS) occur outside the mapped areas of flood liable land.

Consultation with the Council's Floodplain Engineer team occurred during the design development phase.

The proposed MVRS SPS occurs within flood prone land. While it is considered that the proposal would not change flood patterns or local flood behaviour, or lead to an increased risk associated with flooding, consultation under clause 15(2) of the Infrastructure SEPP shall be undertaken with regard to this structure. The project was referred to Council's Senior Floodplain Officer for review on 19 October 2020 (D20/456942), a follow-up referral was submitted on 22 December 2020 (D20/564201). Comments and recommendations are expected in January 2021. Recommendations shall be incorporated and further consultation with Council's Floodplain Engineers shall occur during the detailed design phase for all proposed works in flood liable areas.

Clause 15AA – Consultation with State Emergency Service—development with impacts on flood liable land

The proposal does not constitute a relevant provision as listed in Clause 15AA(2). Consultation is therefore not required.

Clause 15A – Development with impacts on certain land within the coastal zone

The proposal would not occur within a coastal vulnerability area. Consultation is therefore not required.

Clause 16 – Consultation with public authorities other than councils

In consideration of the consultation requirements specified under Clause 16 of the Infrastructure SEPP, the proposed activity:

- would not be undertaken on adjacent to land reserved under the *National Parks and Wildlife Act 1974* or in Zone E1 or in equivalent zones
- would not be undertaken within or adjacent to a marine park or aquatic reserve declared under the *Marine Estate Management Act 2014*
- would not be undertaken in the foreshore area within the meaning of the *Sydney Harbour Foreshore Authority Act 1998*
- does not comprise a fixed or floating structure in or over navigable waters
- is not a development for the purposes of a health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land.
- would not increase the amount of artificial light in the night sky and located on land within the dark sky region as identified on the dark sky region map
- would not be undertaken within Defence communications facility buffer (only relevant to the defence communications facility near Morundah)
- would not be undertaken on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*

The consultation requirements specified under Clause 16 of the Infrastructure SEPP therefore do not apply.

5.2 Community consultation

The proposal was publicly exhibited. Table 8 (below) provides an overview of concerns raised and responses provided. Refer to D20/562981 for complete REF Concerns Register with Shoalwater Responses.

Table 8. Summary of concerns with provided responses from public exhibition

Issue / concern	Response
From: Landowner The spectre of a concrete SPS,on a site 60mx 40m surrounded by a 1.8m fence with associated infrastructure causes me concern as it impacts severely on the amenity of my property. It is apparent that this proposal has been in the pipeline for some time. Are you willing to meet with me,	Thanks for taking my call today to arrange a meeting to discuss the concerns raised regarding the location of a Sewer Pump Station in Bells Lane, Meroo Meadow. As you explained to me, you have made further enquires with your attendance to Council since the email was received and you are now satisfied, at this point that it being some 1 kilometre away from your property, there is no further

explain the proposal in detail and respond to any questions i have?	requirement from Council to meet to discuss the matter raised. "
From: Moss Vale Road North Owners Group 1. The MVRNOG objects to the timeframe of 2024 for the construction of the MVRN SPS – it is proposed that DA's for this area will be being lodged in 2021 and the latest timeframe of 2022 would be considered as satisfactory for the land owners in this area; 2. It appears the SPS site and some of the other associated infrastructure has been designed without reference to the overall masterplan for the MVRN Indicative Layout Plan (ILP) that has been proposed by the MVRNOG and the ILP that has been adopted by Council; 3. We note in Appendix A to the REF (i.e. the Cardno Concept Design Report- Section 4.3), the location of the MVRS SPS and question whether a SPS in that location will cater for the B7 zoned land on Lot 4 DP268209 and the urban zoned land on Lot 1 DP258745 and Lot 261 DP794245 and other urban land in this vicinity. It would appear from some of the contours provided that this SPS will not cater for some of the adjacent urban land; 4. the comment is made that flood levels were not available at the time of preparing the concept plans. This is not the case. The MVRNOG funded a flood study across the entire MVRN site, which was completed by Rhelm and this information was provided to Council in 2019; 5. We note in Appendix A to the REF (i.e. the Cardno Concept Design Report- Section 5.2), the ADWF is 44.8L/s. No ET count is provided so we have no way of knowing if sufficient capacity is being provided in the system. We feel this should be part of the Concept Design Report; 6. We note in Appendix A to the REF (i.e. the Cardno Concept Design Report- Section 5.2), the comment is made that flood levels were not available at the time of preparing the concept plans. This is not the case. The MVRNOG funded a flood study across the entire MVRN site, which was completed by Rhelm and this information was provided to Council in 2019; 7. We note in Appendix A to the REF (i.e. the Cardno Concept Design Report- Section 5.3), the SPS site is indicated as being 350m west of Bells	1. Shoalhaven Water continues to progress this project as a priority project. As way of an update, Shoalhaven Water is currently in detailed design for the water lead in works, with Council targeting construction of the lead in water main mid-late 2021. Council has also just awarded contracts for Detailed Design services for the Wastewater Infrastructure, with design currently scheduled to concluded late 2021 to permit a construction period commencing early 2022 and concluding mid-late 2023. The REF will be updated accordingly to reflect the updated timeframes. 2. Shoalhaven Water did consider the MVRN Indicative Layout Plan (ILP) during the concept design development, however, notes that the original ILP location identified had several identified constraints that supported the relocation to the proposed site. The identified constraints included (no limited to): -Located within the riparian corridor (increased environmental impacts); -Reduced access (limitations for required service vehicles); -Excessive well depth (identified operational constraints). Shoalhaven Water understands that the Development Control Plan for the southern URA is currently under review, with the northern URA DCP yet to be finalised. Accordingly, the SPS was designed and located to minimise well depth, ensure appropriate access, with the MVRN SPS modelled to allow for the catchment nominated below as per the Concept Options Report prepared by Cardno. The catchment was based on available data at the time of the investigation. 3. The MVRS SPS was designed to cater for the development area nominated by the Council Planning Team. As flagged in point 2 above, the catchment is shown as per the Concept Options Report. Lot 4 DP268209, Lot 1 DP258745 and Lot 261 DP794245 all appear to be within the catchment area. Current MVRS SPS gravity inlet to SPS is shown at 29.87m (which was based on a preliminary gravity network to assist with the planning report). MVRS SPS is currently designed at 5m deep, meaning there is capacity and room to increase the SPS depth during detailed design. 4. Your comment is acknowledged, however we note that the flood levels are impacted by the proposed

Lane/Abernethy's Lane intersection. This is incorrect and the site shown is more like 385m to 445m east of the Bells Lane/Abernethy's Lane intersection;	Far North Collector Road being undertaken by Council, and the amended flood levels (considering the new road) are not currently available.
8. With respect to the proposed location of the MVRN SPS site, the proposed location is seriously questioned. The SPS site has been located in the middle of a large area of R1 zoned land and this will seriously sterilise a significant portion of this land which will need to be acquired by Shoalwater at market rates. It is our view that a more suitable site approximately 500m to the east of the Bells Lane/Abernethy's Lane intersection is preferred. It is on high ground and is outside (or at least on the fringe of) the R1 zoned land;	5. The ET calculations have been based on planning information provided by Council's project team, and detailed within the Appendix A Concept Options Report as follows: Moss Vale Road – Ultimate flows (Civil works) New MVRS SPS 2049 ETc 956 ETr 2806 ADWF (L/s) 23.4 PDWF (L/s) 47.2 PWWF (L/s) 131.4 SPS MVR-N 2049 ETc 2568 ETr 5374 ADWF (L/s) 44.8 PDWF (L/s) 84.3 PWWF (L/s) 259.7 Emergency storage is 8 hours at ETc ADWF
9. We note in Appendix A to the REF (i.e. the Cardno Concept Design Report- Section 5.4), the 60m x 40m site is shown in Appendix A. Following a detailed review of the SPS layout drawing C1013 Rev A, we seriously question the need for a 2400m2 site which has to be purchased at full market rates by Shoalwater. We also question the need for a 19m semi-trailer to be able to enter and exit the site without needing to do any reversing – this is over the top and warrants reconsideration. We are therefore of the view that the site could be designed far more efficiently to have a much smaller footprint which reduces the impact on the proposed urban release area, profitability of the landowner and cost base of Shoalwater;	6. Please refer to response 4 above.
10. We repeat the comments made earlier regarding the site location and are of the opinion that a far more suitable site with a smaller footprint can be found approximately 100m further to the north-east;	7. Noted.
11. We also note that the SPS site is in close proximity to the Jemena Gas Pipeline and HV transmission electrical lines and other works also cross these assets in a number of locations and this should be considered carefully in the detailed design;	8. The location of the SPS has been determined in consultation with Council's planners, environmental officers, Shoalhaven Water Operations, and the community; to best meet the needs of Council and Shoalhaven Water, for the safe future operation of the SPS. Gravity service, well depth, safe access and environmental potential impacts were the key considerations during the concept design phase. The proposed relocation of the SPS further east will increase access road required, impose a greater potential environmental impact, and delay the current project schedule with landowner consultation, detailed survey and geotechnical investigation works now completed for the nominated SPS locations and overall alignment. Furthermore, moving the SPS further east will also further increase the wet well depth past the 6-7m depth currently proposed, which imposes further operational limitations which was not desired by Shoalhaven Water.
12. We note in Appendix A to the REF (i.e. the Cardno Concept Design Report- Section 5.4), it is proposed to access the SPS site along Abernethy's Lane. This alignment is seriously questioned principally as the route would cross the southern tributary which in a 1% AEP flood event is approximately 175m wide (along the alignment of Abernethy's Lane). Consideration should be given to accessing the site from further to the south at the access points to 66A-66D Bells Lane using the existing access road where possible. This would negate the	9. The size of the sites identified represent Shoalhaven Water's standard sizing requirements for all SPS sites, allowing for access and circulation of a 19m vehicle turning path and onsite emergency storages capacity. Furthermore, Shoalhaven Water requires onsite

need for a significant culvert crossing in an area where no future road is proposed. Obviously, Shoalwater would need to be responsible for a share of the ongoing maintenance of this road and any damage caused during construction; 13. We have also reviewed the drawings in Appendix A of the Cardno report and provide the following comments which have not yet been made above: - Dwg C1000 – we note the MVRS Gravity main is proposed to cross the Jemena Gas Main and HV Transmission lines in two locations; - Dwg C1006 – we query the location of the MVRS RM and GM within the Bells Lane Road Reserve. The MVRN ILP proposed a major upgrade to Bells Lane and the proposed infrastructure should be designed to ensure that it does not conflict with future roadworks which would require its relocation and potential damage; - Dwg C1006 – we query the MVRS RM location where it crosses Moss Vale Rd. This intersection will have major upgrade as part of the FNC Rd project and will become a signalised intersection. The pipe crosses Moss Vale Rd at an oblique angle which should be reconsidered for the future maintenance issues that could arise; - Dwg C1007 – we query how the design of the MVRS GM will take into account the future road upgrade of Bells Lane particularly the two watercourse crossings in the vicinity of Abernethy's Creek and the southern tributary where there will be significant fill; - C1013 -we note the overflow pipework is shown as draining to Bomaderry Creek however the SPS is nowhere near any watercourse; - a flood study across the entire MVRN site, which was completed by Rhelm and this information was provided to Council in 2019; 14. Section 3.6 of the REF proper discusses flood liable land. IT is also noted that the <MVRNOG flood study has not been considered and there are significant watercourse crossings of the MVRN URA which need to be considered;With respect to the above matters we strongly urge Shoalwater to engage with the MVRNOG via its consultants APS to discuss these matters in more detail to avoid unnecessary costs now and in the future.	area for future landscaping and screening to assist with the general amenity of the area. 10. Proposed location is deemed not suitable as the wet well would be too deep at this location and this has been identified as a limitation for Shoalhaven Water. 11. Noted, Council to continue to engage with identified utility providers during detailed design and future construction phases of the works. 12. Please note that this is a sewer main and not a culvert. The design has been determined to connect into the future trunks sewer main serving the MVRN development. With regards to providing access to MVRN SPS by using access points to 66A-66D, Bells Lane using the existing access road, Council notes that this was investigated during the concept design however was not preferred due to restrictions on the required 19m truck. 13. Noted, Council to consider and incorporate as/where deemed appropriate during detailed design. Council further notes that the rising main alignment crossing all future road and intersection upgrades can be designed deeper to future proof the works as deemed necessary as part of future authority discussions and approvals. The gravity main alignment was also kept along Bells Ln to reduce impact on existing and future lots. 14. Acknowledged. To be referred to Council's Environmental Officer for review, consideration and incorporation within the final REF as deemed necessary.

The main concerns are timing and location of infrastructure and its impact on the future URA's.	
From: Sydney Trains Sydney Trains is formally seeking an extension of the time frame to enable sufficient reviews to be undertaken with our internal and cluster stakeholders for the proposed works. Sydney Trains will have particular attention to the works proposed immediately adjacent and within TAHE (Transport Asset Holding Entity – formally RailCorp) land. In addition, current initial reviews seek clarification for the following in association with the proposed works: 1. Does Council have any agreements for works to be undertaken in TAHE land; 2. Does Council have any existing easements or licences specifically with TAHE (previously RailCorp) for use of TAHE land (for any purpose); 3. Does Council have any existing excavation and construction methodologies which will apply to these works, specifically for work in TAHE land; 4. Has Council undertaken any Contamination Assessments on the land where the works are proposed (in particular land immediately adjacent to or within TAHE land); 5. Does Council have any existing pipes which are the subject of these proposed works, in TAHE land, or are these ground works and pipes new; 6. The document available on Council's website only refers to it as "Part 2: Sewer Infrastructure"; please advise what Part 1 related to. Sydney Trains has also been liaising RMS / TfNSW, whom also request an extension to the review time frame. They may have additional queries to the above, and your details have been passed on to them. If Sydney Trains received any particular queries, we may make these on behalf of the Transport cluster, or vice versa. Primary contact for RMS: Chris.Millet@transport.nsw.gov.au Contact for TfNSW: development@transport.nsw.gov.au	Yes, proposed approach is acceptable. Council does not intend on extending the official period in which the Document is on Public Exhibition, we take no objections to your request for an extended response period being no later than 17 December 2020, refer to email by Andrew Lissenden from TfNSW, see attached. Following reply in response to your raised concerns. 1. Does Council have any agreements for works to be undertaken in TAHE land; Yes. As per attached email to CI Australia [EMAIL to CI Australia Pty Ltd.pdf], Council has requested a copy of the agreement as we have been unable to locate this on our system, however as per attached invoice [Rent payment slip to CI Australia Pty Ltd.pdf] regularly (annually) make payment for all our infrastructure crossing railway properties, see attached schedule listing all services crossing railway properties [Shoalhaven Schedule of Agreements.pdf]. 2. Does Council have any existing easements or licences specifically with TAHE (previously RailCorp) for use of TAHE land (for any purpose); Yes, as detailed in item 1 above. 3. Does Council have any existing excavation and construction methodologies which will apply to these works, specifically for work in TAHE land; No. We do however not that the anticipated works will entail underboring of the new wastewater main within the exiting rail crossing easement – refer extracts below to assist (new magenta line represents the new 560mm main proposed). 4. Has Council undertaken any Contamination Assessments on the land where the works are proposed (in particular land immediately adjacent to or within TAHE land); No. See enclosed extract of draft REF mitigations with regards to soil and water. 5. Does Council have any existing pipes which are the subject of these proposed works, in TAHE land, or are these ground works and pipes new; Yes, the intended works will be ran within the existing easement railway crossing (currently have DN150 and DN300 services crossing). 6. The document available on Council's website only refers to it as "Part 2: Sewer Infrastructure"; please advise what Part 1 related to. Part 1 relates to Water Infrastructure, however this does not extend across any railway properties, see enclosed link FYI:

	https://shoalhaven.infocouncil.biz/Open/2020/10/SA_20201013_ATT_16088_EXCLUDED.HTM#PDF3_ATTACHMENT_45518_1
From: Sydney Trains 1. Prior to the commencement of any works adjacent to and/or within the Rail Corridor, TAHE (Transport Asset Holding Entity) land or rail related easements, consultation and approval is to be obtained from Sydney Trains to ensure there are no potential impacts to the rail corridor or infrastructure and that any works undertaken within the rail corridor are in accordance with any lease agreement(s). 2. All requests, consultation, provision of documentation associated with the proposed works are to be emailed to Illawarra_Interface@transport.nsw.gov.au 3. No work is permitted within the rail corridor, or any easements which benefit Sydney Trains/TAHE (Transport Asset Holding Entity), at any time, unless the prior approval of, or an Agreement with, Sydney Trains/TAHE (Transport Asset Holding Entity) has been obtained by Council. a. No works are permitted to be undertaken in the rail corridor outside the area as defined by the existing lease unless otherwise agreed to. 4. During all stages of the works, extreme care should be taken to prevent any form of pollution or contamination from entering the rail corridor (TAHE land). 5. During and as a result of the works, drainage is not to be directed, disposed or discharged into the rail corridor.	1. Noted, consultation will be undertaken during detailed design development and submitted for approval from Sydney Trains. 2. Noted. 3. Noted. 4. Noted. 5. Noted.
From: Transport for NSW 1. TfNSW records show that Lot 602 DP 1223625 and Lot 435 DP 1210528 have been acquired by TfNSW for the Berry to Bomaderry Princes Highway upgrade (refer to Attachment 1). These lots are proposed to be declared a controlled access road/public road (i.e. become part of the Princes Highway road reserve) sometime after the completion of the upgrade which at this time is scheduled for 2022. 2. Lot 602 DP 1223625 and Lot 435 DP 1210528 is land that is designated road on the deposited plans. Council's records, based on Table 1 in the REF,	1. Noted. 2. Noted. 3. Noted, contacts nominated will be consulted. 4. Noted, consultation will be undertaken during detailed design development and submitted for approval.

indicate that TfNSW owns the land but also indicate that Council may not be aware that the land is designated road. The creation of a services easements on land designated road reserve is not generally required. 3. Prior to the commencement of any works on Lot 602 DP 1223625 and Lot 435 DP 1210528, or within/under the existing Princes Highway road reserve discussions shall be had with TfNSW Property Unit as well as the Berry to Bomaderry - Princes Highway upgrade project team. Contact details are provided below: a. Property Unit: Ivo Pacitto (Senior Property Officer) Ph: 4221 2495 Email: Ivo.Pacitto@transport.nsw.gov.au b. Berry to Bomaderry – Princes Highway Upgrade: Jason Llyod (Project manager/Engineer) – Ph: 8874 6834 or 0418 299 379 Email: Jason.Lloyd2@transport.nsw.gov.au; or Shaun Walsh (Project Contract Manager) – Ph: 4221 2504 or 0407 463 105 Email: Shaun.WALSH@transport.nsw.gov.au. 4. Prior to the commencement of works within/under the Moss Vale Road reserve and the Princes Highway road reserve TfNSW will need to provide approval (i.e. Section 138 consent under the Roads Act 1993). The detailed design plans submitted for approval shall demonstrate compliance with the following: c. a) The work will need to be by under boring or tunnelling. No trenching is allowed. d. b) Standard depth requirements of min 1.5 m below road level would apply: and e. c) Sleeving of the pipe under the road formation would be required to eliminate the need to excavate the road in the future should a maintenance problem occur. To obtain the required approval contact shall be made with TfNSW Southern Asset Section via the email SRO_PublicUtilities@rms.nsw.gov.au 5. Prior to the commencement of works that impact a classified road reserve and/or TfNSW owned land Council will need to consider and address any environmental impacts of the proposed works in accordance with applicable legislation. This includes consideration and mitigation of issues including, but not limited to, traffic/road safety, flora/fauna, noise,	5. Noted.

heritage, contamination, impact upon the community, etc.	
From: Landowner As Abernethys Creek runs through our property, directly downstream from the overflow area of the associated SPS, we read the document in relation to our concerns about this. In the event of an ""SPS overflow"", are you aware of when they occur? Are there any records of overflow events made publicly available? Can we be notified of an ""SPS overfow event"" so that we can monitor the impact on Abernethys Creek, and our property for ourselves?"	1. Yes, if an overflow event occurs, Shoalhaven Water are notified through our telemetry system; we then report the incident to the Environment Protection Authority (EPA) as a condition of our licence. For your reference, Council notes that the project has adopted the NSW Public Works standard for overflow, i.e. design to 1in5 years rainfall event with onsite provision for eight (8) hours of emergency storage. 2. Not at the time of the event itself. The EPA has indicated that they would be able to confirm whether an overflow incident has been reported or not (via their hotline 131555) should the public wish to enquire. Council does however prepare as part of our annual National Performance Reporting, a report on all Overflow events, which is submitted to the NSW Department of Planning, Industry and Environment. The NSW Department of Planning, Industry and Environment then compile their own report and publicly release. 3. Notifications to the public are generally only undertaken in the case of major overflow occurrences. Council's environmental services team will attend site to implement the appropriate control measures and inform affected residents direct impacted.
From: Landowner > We readily acknowledge the need for the substation and related wastewater lines running through the development zone. >Our particular environmental concern is the current proposed positioning of the substation as it relates to the substrata in which the substation is to be located, thereby raising additional environmental hazard management issues. > When test bores were being done on the proposed location ,we were told by the staff engaged that there significant flows of fresh running water not far below the surface.	1. Noted. We understand reference to substation in the response refers to the associated Sewer Pumping Station (SPS). 2. The SPS was designed and located in consultation with Council's environmental officers, operations team and designers, to minimise well depth, ensure appropriate servicing access is provided and to ensure that the Moss Vale road Northern (MVRN) SPS allowed for the full catchment identified as part of Council's Concept Options Report. Furthermore, the location of the SPS has been determined in consultation with Council's planners, environmental officers, Shoalhaven Water Operations, and the community; to best meet the needs of Council and Shoalhaven Water, for the safe future operation of the SPS. Gravity service, well depth, safe access and environmental potential

> Our concern is that there will be unintended consequences should the substation be located in the spot currently proposed. > First,laying the underground holding tanks may not be straightforward. > Second,and potentially more significantly,when substantial rainfall occurs,the disruption to the existing natural underground water course may create new localised flooding/ boggy ground in adjacent areas. > We understand the likelihood of accidental waste water spillages / excess waste flows occurring can occur but ,in normal weather circumstances , we assume this would not be an issue.However, there is a reasonably significant distance between the substation and Abernathys Creek watercourse and overflows could progressively despoil nearby land. > Our query also relates to whether high rainfall could create greater than expected waste control flow concerns. > We are not consulting engineers or environmental experts but we do question why the actual proposed positioning of the substation be located in what we understand would be in the middle of significant underwater flows and on land zoned residential. > From a risk management mitigation perspective further bore testing should be undertaken in the proximate vicinity. > And in particular,to relocate the substation around 50 m south would position the within the adjacent council-owned land just south of the proposed substation location.Indeed, the unformed part of Abernathys Lane council-owned land further east has high and what would appear dry ground and would be closer to riparian land better suited to absorb a greater volume of excess waste water runoff. > The reasons for making this latter suggestion are of course ,in part prompted by personal commercial considerations: > (1)to minimise the disruption to our current thoroughbred horse stud > operations; (2)to minimise potential value loss from land acquired by > Council; (3)to minimise the time and associated legal and related > costs to Council and we the owners in negotiating the acquisition of the land by Council;and just as	impacts were the key considerations during the concept design phase. Proposed changes to the identified site would likely increase access road requirements, impose greater potential environmental impact, and delay the current project schedule with landowner consultation, detailed survey and geotechnical investigation works now completed for the nominated SPS locations and overall alignment. Furthermore, moving the SPS from the preferred location will also likely further increase the wet well depth past the 6-7m depth currently proposed, which imposes further operational limitations which was not desired by Shoalhaven Water. 3. Noted, however the presence of significant flows is not unexpected due to the general topography of the site (SPS typically located at low points to allow catchment flows to gravitate to the SPS). With regards to potential environmental impacts, the environmental officers and designers concluded that based on the proposed size of the infrastructure, it would have a minimal/negligible impact on groundwater movement. 4. Please refer to response 2 above. Essentially the Review of Environmental Factors investigation and reporting have considered potential impacts and helped inform the design team to identify an acceptable site which mitigates against all potential environmental impacts, whilst maintains optimum operational performance. 5. The project has been able to mitigate such risk by undertaking geotechnical investigations of the proposed site. Based on the conducted geotechnical investigations, Council's designers concluded that the works as propose are feasible and do not impose any unacceptable risks to Council, the community or the project. 6. Based on the investigations undertaken, Council does not consider the proposed works to impose any unacceptable risks to Council, the community or the project. The impacts to potential groundwater movements has been considered as part of the investigation works and it has been concluded that based on the proposed size of the infrastructure, it would have a minimal/negligible impact on groundwater movement. Additionally, as the ground water table is relatively close to the invert level of the wet well, disturbance of the water table is considered extremely unlikely and the project does not anticipated more ground level flooding associated with the proposed works. 7. Council notes that the project has adopted NSW Public Works standard for overflow, i.e. design to 1in5 years rainfall event with onsite provision for eight (8)

importantly; (4)the opportunity to minimise the potential for nearby future house owners to be concerned about water management / waste water flowing through or near their properties,with concomitant home value reduction/ family health concerns. > Even with no water control issues,it would seem likely nearby blocks of land will lose some value because of visual and potential waste control concerns.	hours of emergency storage. Furthermore it is a legislated requirement (enforceable licence condition) that Council must report any/all overflow events to Environment Protection Authority (EPA); with Council then required to comply with all EPA requirements. 8. Please refer to response 7 above. Essentially, any rainfall event in excess of the design rainfall event and onsite emergency storage provisions has the potential to lead to a reportable overflow event. This is a typical of all wastewater networks across the country. To mitigate against the risk of overflow event, all new (and progressively most existing) SPS are provided with 8hr emergency storages. The intention of this is that the emergency storage provides additional capacity for the SPS to store excessive flows (typically during the higher intensity periods of a storm event) when the risk of overflows events are greatest. When the storm passes and flows once again typically reduces, the emergency storage flows captured during the event slowly gravitate back to the SPS and back to normal operation (thus significantly reducing the potential for any uncontrolled overflow event). Fortunately, the proposed infrastructure for this project is predominately new mains and SPSs, which would significantly reduce the risk of unauthorised infiltration flows, which often impact existing networks (i.e. illegal stormwater connections to the sewer mains). 9. Please refer to responses 2, 3 & 4 above. 10. A significant geotechnical investigations program has now been completed as part of the initial works for this project. The investigations support the proposed works (do not identify any unacceptable risks). The need for any further geotechnical investigation testing will be assessed as Council proceeds through the detailed design phases of the project. 11. Please refer to responses 2, 3 and 4 above. Placement of the SPS within the Council owned road reserve was previously investigated however deemed not suitable as this location would require a significantly deeper wet well (beyond that accepted by SW Operations) and presented limitations with regards to safe access for the 19m service vehicle. 12. Council acknowledges and notes your queries with regards to this project, As stated above, the location of the SPS and all wastewater infrastructure proposed to service the Moss Vale Road Urban Release Area has been determined following an intensive consultation process with Council's planners, environmental officers, Shoalhaven Water Operations, and the community; to best meet the needs of the proposed URA, Council and

	specifically Shoalhaven Water; ultimately for the safe future operation of the SPS and future residents. Where possible, Council's initial approach was to investigate Council owned lands for the proposed works. We were fortunately to identify a Council owned site in the southern URA for the proposed MVRS SPS, however unfortunately the Council owned lands to the north revealed significant limitations which ruled them out. Please note as part of the intended works, Council will look to implement a landscaping treatment to the SPS sites to help alleviate any perceived or actual aesthetic concerns. With regards to ongoing land matter discussions, we look forward to continuing to progress on our existing relationship through Council's identified Property Officer(s). We hope this helps to clarify your concerns, please feel free to contact for any further information."

6. ENVIRONMENTAL SAFEGUARDS AND MEASURES TO MINIMISE IMPACTS

General

1. Easements through private land shall be established where required and authorisation for work within NSW Roads and Maritime Services land and Railcorp NSW (Sydney Trains) land shall be acquired prior to commencement of works within these areas. Under-boring (micro tunnel or horizontal directional drilling (HDD)) where required must comply with relevant authority approvals.
2. Notification via mail to any properties whose access shall be affected by works shall be undertaken prior to commencement of works.
3. The operation of the sewerage system, including the management of SPS overflows shall be in accordance with an EPA issued environmental protection licence.
4. Amenity screen plantings shall be established and maintained around Sewer Pump Stations following construction, in accordance with site specific landscape plans. Plantings shall be of suitable native species (e.g. Callistemon, Melaleuca, Syzygium species – cultivars acceptable) with a suitable growth height for screening purposes, with consideration to minimising maintenance requirement.
5. An asset form must be trimmed to file 44574E on commissioning of each facility within the proposed activity in accordance with POL15/8 Asset Accounting Policy section 3.1.4 and POL16/79 Asset Management Policy section 3.3. Asset forms are available are webpage http://sccintranet/AssetsWorks/TechnicalServices/AssetStrategy/AssetForms.aspx

Works in flood-liable land

6. Continued consultation with Council's Floodplain Engineers shall occur during the detailed design phase for all proposed works in flood liable areas.
7. For SPSs proposed in floodways, an appropriate consulting engineer's report shall be commissioned to:
    a. demonstrate that the proposed structure could withstand forces of floodwaters including debris and buoyancy forces up to a 1% AEP flooding scenario.
    b. demonstrate that the development would not increase flood hazard or flood damage to other properties or adversely affect flood behaviour for a 5% AEP up to the Probable Maximum Flood (PMF) scenario.
8. Building materials used for SPSs must be of materials compatible with immersion in accordance with Schedule 4 of Shoalhaven Development Control Plan (SDCP – Chapter G9) and the NSW Flood Plain Development Manual 2005.
9. Electrical installation for SPSs should comply with the National Construction Code *Construction of buildings in flood hazard areas* (ABCB 2012).

Soil and water

10. From Chainage 2400m to 3250m (mapped as Class 3 and Class 4 Acid Sulfate Soils), sampling and analysis shall be undertaken to determine the need for an Acid Sulfate Soil Management Plan and inform the plan if management and treatment of excavated soil is required.
11. A Fisheries Permit shall be obtained for the construction of the access track to MVRN SPS. Works involving excavation within the watercourse crossing the unformed section of Abernethys Lane between Bells Lane and the site of MVRN SPS are not permitted without an approved Fisheries Permit.
12. Under-boring (micro tunnel or horizontal directional drilling (HDD)) shall be applied where the crossing of creeks and watercourses (in addition to roads and the railway line) is required to every practical extent, to minimise disturbance to these areas.
13. Erosion and sediment controls in accordance with the 'Blue Book' (Landcom 2004) shall be installed and maintained to prevent the entry of sediment into waterways i.e. water diversion, minimising disturbance, erosion control and rapid re-establishment. Erosion and sediment controls shall be maintained in good working order for the duration of the works and subsequently until the site has been stabilised and the risk of erosion is minimal.
14. A dewatering plan shall be developed and implemented for each SPS site in the event that excavation for installation of wet wells encounters the water table associated with Bomaderry or Abernethys Creek and/or coincides with significant rain events. Pooled water shall be discharged via low velocity pump into a bund constructed of a geofabric wrapped straw-bales and situated at least 20 metres from the creek in a grassy vegetated area such that the filtered water would enter the creek downstream of the works. The geofrabric shall be replaced as required and disposed of in a licenced waste facility.
15. Sewer Pump Station overflows shall include trash grates and discharge to grassed / vegetated swales from a point as close to the SPS as possible.

Flora and Fauna protection

16. The watercourse containing Illawarra Lowlands Grassy Woodland EEC between the site of proposed MVRS SPS and Moss Vale Rd, along the future Far North Collector Rd alignment (in the vicinity of photo-point P1 – refer also to Photo 1), shall be under-bored to minimise impacts to vegetation and the waterway. If it is not possible to under-bore this location, the construction corridor must be reduced to no more than 5m and all native trees and shrubs retained to every practical extent.
17. Native vegetation removal and pruning shall be undertaken only to the extent required to construct and maintain the proposed sewer infrastructure.
18. Pruning of trees where required is to be undertaken in accordance with AS 4373-1996 "Pruning of Amenity Trees".

19. Impact to the structural root zones of trees to be retained shall be avoided to every practical extent.

20. In the event that any wildlife be significantly disturbed or injured during works, Council's Environmental Officers are to be contacted on 4429 3405, or if unavailable, Wildlife Rescue – South Coast should be contacted on 0418 427 214, to rescue and relocate the animal(s).

Aboriginal heritage

21. Under-boring to a depth no less than 400 mm, shall be undertaken through the area covered by the "Abernethys Creek" PAD (52-5-0754) to avoid impact to this area and ensure avoidance of site 52-5-0287 (refer to Figures 9 and 10). Under-boring shall involve monitoring of excavation for entry and exit pits where required, by Nowra Aboriginal Land Council Aboriginal Heritage Site Officers.

22. Amendment of the current AHIP application for harm to sites 52-5-0932, 52-5-0931, and 52-5-0933 associated with the Far North Collector Road shall be sought to also allow for harm to sites as a result of the current sewer infrastructure proposal.

    Alternatively, under-boring through the area in the vicinity of site 52-5-0931, to a depth no less than 400mm could be undertaken to ensure no impact to the site.

23. Location and identification of sites 52-5-0694 (GDA94: E281938 N6142393) and 52-5-0753 (GDA94: E280248 N6142928) with hi-visibility para-webbing or similar shall be undertaken prior to works in these areas to avoid potential impact to these sites.

24. Staff working at the site will be instructed to stop work immediately on identification of any suspected Aboriginal heritage artefact. If any objects are found, NSW Department of Planning, Industry and Environment (ph:131 555) shall be contacted.

Sydney Trains authority and Transport for NSW

25. Prior to the commencement of any works adjacent to and/or within the Rail Corridor, TAHE (Transport Asset Holding Entity) land or rail related easements, consultation and approval is to be obtained from Sydney Trains to ensure there are no potential impacts to the rail corridor or infrastructure and that any works undertaken within the rail corridor are in accordance with any lease agreement(s).

26. All requests, consultation, provision of documentation associated with the proposed works are to be emailed to Illawarra_Interface@transport.nsw.gov.au

27. No work is permitted within the rail corridor, or any easements which benefit Sydney Trains/TAHE (Transport Asset Holding Entity), at any time, unless the prior approval of, or an Agreement with, Sydney Trains/TAHE (Transport Asset Holding Entity) has been obtained by Council.

28. No works are permitted to be undertaken in the rail corridor outside the area as defined by the existing lease unless otherwise agreed to.

29. During all stages of the works, extreme care should be taken to prevent any form of pollution or contamination from entering the rail corridor (TAHE land).
30. During and as a result of the works, drainage is not to be directed, disposed or discharged into the rail corridor.
31. Lot 602 DP 1223625 and Lot 435 DP 1210528 is land that is designated road on the deposited plans. Council's records, based on Table 1 in the REF, indicate that TfNSW owns the land but also indicate that Council may not be aware that the land is designated road. The creation of a services easements on land designated road reserve is not generally required.
32. Prior to the commencement of any works on Lot 602 DP 1223625 and Lot 435 DP 1210528, or within/under the existing Princes Highway road reserve discussions shall be had with TfNSW Property Unit as well as the Berry to Bomaderry - Princes Highway upgrade project team. Contact details are provided below:

    a. Property Unit: Ivo Pacitto (Senior Property Officer) Ph: 4221 2495 Email: Ivo.Pacitto@transport.nsw.gov.au

    b. Berry to Bomaderry – Princes Highway Upgrade: Jason Llyod (Project manager/Engineer) – Ph: 8874 6834 or 0418 299 379 Email: Jason.Lloyd2@transport.nsw.gov.au; or Shaun Walsh (Project Contract Manager) – Ph: 4221 2504 or 0407 463 105 Email: Shaun.WALSH@transport.nsw.gov.au.
33. Prior to the commencement of works within/under the Moss Vale Road reserve and the Princes Highway road reserve TfNSW will need to provide approval (i.e. Section 138 consent under the Roads Act 1993). The detailed design plans submitted for approval shall demonstrate compliance with the following:

    a) The work will need to be by under boring or tunnelling. No trenching is allowed.

    b) Standard depth requirements of min 1.5 m below road level would apply: and

    c) Sleeving of the pipe under the road formation would be required to eliminate the need to excavate the road in the future should a maintenance problem occur.
34. To obtain the required approval contact shall be made with TfNSW Southern Asset Section via the email SRO_PublicUtilities@rms.nsw.gov.au
35. Prior to the commencement of works that impact a classified road reserve and/or TfNSW owned land Council will need to consider and address any environmental impacts of the proposed works in accordance with applicable legislation. This includes consideration and mitigation of issues including, but not limited to, traffic/road safety, flora/fauna, noise, heritage, contamination, impact upon the community, etc.

7. SIGNIFICANCE EVALUATION & CONCLUSION

This Review of Environmental Factors has assessed the likely environmental impacts, in the context of Part 5 of the Environmental Planning and Assessment Act 1979, of a proposal by Shoalhaven City Council for the construction of sewer infrastructure to service the Moss Vale Rd URAs.

Shoalhaven City Council has considered the potential environmental effects of the proposal and the effectiveness and feasibility of measures for reducing or preventing detrimental effects. It is determined that:

1. The proposed safeguards and mitigation measures identified in the report (Section 6) shall be adopted and implemented.
2. It is unlikely that there will be any significant environmental impact as a result of the proposed work and an Environmental Impact Statement is not required for the proposed works.
3. The proposed activity is not likely to significantly affect threatened species, populations or ecological communities, or their habitats and a Species Impact Statement / BDAR is not required.
4. No additional statutory approvals, licences, permits and external government consultations are required.

Robert Horner

Executive Manager

Shoalhaven Water

Shoalhaven City Council Date: .....

Document Review:

	Name	Signature	Date
Author:	Jeff Bryant		19/10/2020
Reviewed by:	Geoff Young		27/10/2020
Revised:	Jeff Bryant		23/12/2020

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APPENDIX A

"Concept Design Report Moss Vale Road"

Consultant report including layout plans with longitudinal sections by Cardno Pty Ltd

Council reference D20/450654

APPENDIX B

Likelihood of Occurrence Table (NSW Threatened Species)

Likelihood of occurrence table

The table of likelihood of occurrence evaluates the likelihood of threatened species to occur on the subject site. This list is derived from previously recorded species within a 5 km radius (taken from NSW BioNet Atlas) around the subject site. Ecology information unless otherwise stated, has been obtained from the *Threatened Biodiversity Profile Search* on the NSW OEH (Office of Environment & Heritage) online database (https://www.environment.nsw.gov.au/threatenedspeciesapp/).

Likelihood of occurrence in study area

1. Unlikely – Species, population or ecological community is not likely to occur. Lack of previous recent (<25 years) records and suitable potential habitat limited or not available in the study area.
2. Likely – Species, population or ecological community could occur and study area is likely to provide suitable habitat. Previous records in the locality and/or suitable potential habitat in the study area.
3. Present – Species, population or ecological community was recorded during the field investigations.

Possibility of impact

1. Unlikely – The proposal would be unlikely to impact this species or its habitats. No NSW *Biodiversity Conservation Act 2016* "Test of Significance" or EPBC Act significance assessment is necessary for this species.
2. Likely – The proposal could impact this species, population or ecological community or its habitats. A NSW *Biodiversity Conservation Act 2016* "Test of Significance" and/or EPBC Act significance assessment is required for this species, population or ecological community.

Endangered Ecological Community name	*Status*	*Likelihood of presence within areas impacted by the activity*
Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions	Endangered - *NSW* BC *Act*	Does not occur on-site and is not mapped as occurring in close proximity to the site (nearest records are approx. 1.1km south-west from the southern-most part of the site).
Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	Endangered - *NSW* BC *Act* Critically Endangered - Commonwealth *EPBC Act*	Mapped as occurring in close proximity to the site. Site survey confirmed the EEC within the project footprint. Further assessment required.
Illawarra Subtropical Rainforest in the Sydney Basin Bioregion	Endangered - *NSW* BC *Act*	Does not occur on-site and is not mapped as occurring in close proximity to the site (nearest records are approx. 1.8km to the north of the site).
Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions	Endangered - *NSW* BC *Act* Endangered - Commonwealth *EPBC Act*	Does not occur on-site and is not mapped as occurring in close proximity to the site (nearest records are approx. 1.1km south-west from the southern-most part of the site).

Species name	***Status***	***Habitat requirements (www.environment.nsw.gov.au)***	***Likelihood of presence within areas impacted by the activity***
FLORA			
Cryptostylis hunteriana Leafless tongue Orchid	Vulnerable EPBC Act Vulnerable NSW BC Act	Occurs in a wide variety of habitats from moist sandy soil to dense heathland, sedgeland and verges of fire trails. The larger populations typically occur in woodland dominated by Scribbly Gum (Eucalyptus sclerophylla), Silvertop Ash (E. sieberi), Red Bloodwood (Corymbia gummifera) and Black Sheoak (Allocasuarina littoralis); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (C. subulata) and the Tartan Tongue Orchid (C. erecta).	Unlikely to occur. No suitable habitat present within or in vicinity of site.
Eucalyptus langleyi Albatross Mallee	NSW BC Act Vulnerable EPBC Act Vulnerable	Found in Mallee shrub land on poorly drained, shallow, sandy soils on sandstone.	No suitable habitat. Does not occur. A conspicuous species, not detected during site surveys
Genoplesium baueri Bauer's Midge Orchid	Endangered *EPBC Act* Endangered *NSW* BC *Act*	Grows in dry sclerophyll forest and moss gardens over sandstone.	Marginal suitable habitat occurs. Further assessment required.

Hibbertia stricta subsp. furcatula	Endangered NSW BC Act	Habitat of the Southern Sydney population is broadly dry eucalypt forest and woodland. This population appears to occur mainly on upper slopes and above the Woronora River gorge escarpment, at or near the interface between the Lucas Heights soil landscape and Hawkesbury sandstone. Toelken & Miller (2012) note that the species usually grows in 'gravelly loam or clay soil in heath under open woodland'. Habitat of the South Coast population is poorly recorded, but appears to be dry sclerophyll forest or woodland associations in sandy soils over sandstone.	Marginal suitable habitat occurs. Survey within potential habitat concluded that the species does not occur within the site (refer to Section 2.1)
Pterostylis gibbosa Illawarra Greenhood	Endangered EPBC Act Endangered NSW BC Act	All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum Eucalyptus tereticornis, Woollybutt E. longifolia and White Feather Honey-myrtle Melaleuca decora. Near Nowra, the species grows in an open forest of Spotted Gum Corymbia maculata, Forest Red Gum and Grey Ironbark E. paniculata. In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark E. crebra, Forest Red Gum and Black Cypress Pine Callitris endlicheri. The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The leaf rosette grows from an underground tuber in late summer,	Marginal suitable habitat occurs. Further assessment required.

		followed by the flower stem in winter. After a spring flowering, the plant begins to die back and seed capsules form (if pollination has taken place). As with many other greenhoods, male fungus gnats are believed to be the pollinator. The Illawarra Greenhood can survive occasional burning and grazing because of its capacity to reshoot from an underground tuber.	
Pterostylis pulchella Waterfall Greenhood	NSW BC ACT Vulnerable EPBC Act Vulnerable	The Waterfall Greenhood is found on cliff faces close to waterfalls and creek banks and mossy rocks alongside running water. Flowers appear from February to May	Unlikely to occur. No suitable habitat present within or in vicinity of site.
Pterostylis ventricosa	Critically endangered NSW BC Act	Predominantly in more open areas of tall coastal eucalypt forest often dominated by one or more of the following tree species:- Turpentine, Spotted Gum, Grey Ironbark, Blackbutt, White Stringybark, Scribbly Gum and Sydney Peppermint. Often favours more open areas such as along powerline easements and on road verges where the tree overstorey has been removed or thinned. Grows in a range of groundcover types, including moderatley dense low heath, open sedges and grasses, leaf litter, and mosses on outcropping rock. Soil type ranges from moisture retentive grey silty loams to grey sandy loams. Sometimes found in skeletal soils on sandstone rock shelves	Unlikely to occur. No suitable habitat present within or in vicinity of site.

Pterostylis vernalis	Critically Endangered EPBC Act Critically Endangered NSW BC Act	Pterostylis vernalis grows in open sites in shallow soil over sandstone sheets, in heath and heathy forest.	Unlikely to occur. No suitable habitat present within or in vicinity of site.
Rhodamnia rubescens Scrub Turpentine	Critically Endangered NSW BC Act	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	No suitable habitat. Does not occur. A conspicuous species, not detected during site surveys
Solanum celatum	NSW BC Act Endangered	Grows in rainforest clearings or in wet sclerophyll forests. Flowers August to October and produces fruit between December and January. Normally recorded in disturbed margins and clearings.	No suitable habitat. Does not occur. A conspicuous species, not detected during site surveys
Triplarina nowraensis Nowra Heath Myrtle	NSW BC Act Endangered EPBC Act Endangered	Nowra Heath Myrtle occurs on poorly drained, gently sloping sandstone shelves or along creek lines underlain by Nowra Sandstone. The sites are often treeless or have a very open tree canopy due to the impeded drainage.	No suitable habitat. Does not occur. A conspicuous species, not detected during site surveys

Zieria baeuerlenii Bomaderry Zieria	NSW BC Act Endangered EPBC Act Endangered	Occurs on skeletal sandy loam overlaying sandstone, on a rocky plateau amongst sandstone boulders in either shrubby open forest, shrubby woodland or closed shrub.	No suitable habitat. Does not occur. A conspicuous species, not detected during site surveys
Zieria tuberculata Warty Zieria	NSW BC Act Vulnerable EPBC Act Vulnerable	Grows in heath amongst rocky outcrops on rain forest edges and in tall forest and shrubland.	No suitable habitat. Does not occur. A conspicuous species, not detected during site surveys
AMPHIBIANS			
Giant Burrowing Frog *Heleioporus australiacus*	Vulnerable EPBC Act Vulnerable NSW BC Act	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. While in these areas, individuals burrow below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. Frogs breed after heavy rain mainly in late summer and Autumn from February to April. Eggs usually laid out of water in a moist burrow in	Unlikely to occur. No suitable habitat within the site.

		sandy clay banks of smaller creeks, dams or ephemeral pools in forest (Anstis 2017).	
Green and Golden Bell Frog *Litoria aurea*	Vulnerable *EPBC Act* Endangered *NSW* BC *Act*	Heath, woodland and open dry sclerophyll forest on a variety of soil types except clay based. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Breeding frogs will call from open spaces, under vegetation or rocks or from within burrows in the creek bank. Egg masses are laid in burrows or under vegetation in small pools. After rains, tadpoles are washed into larger pools where they complete their development in ponds or ponded areas of the creekline. Tadpole development ranges from Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water.	Marginal habitat occurs in north-east corner of site. Further assessment required.
REPTILES			
Broad-headed Snake *Hoplocephalus bungaroides*	Endangered *NSW* BC *Act* Vulnerable *EPBC Act*	The Broad-headed snake is largely confined to Triassic and Permian sandstones, including Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. They are a nocturnal species that shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. It moves from the sandstone rocks to shelter in crevices or	Unlikely to occur. No suitable habitat within the site.

		hollows in large trees within 500 m of escarpments in summer. Feeds mostly on geckoes and small skinks; will also eat frogs and small mammals occasionally.	
MICRO-CHIROPTERAN BATS			
Eastern Bentwing-bat *Miniopterus orianae oceanensis*	NSW BC Act Vulnerable	Specific caves are known maternity sites with other caves being primary roosting habitat outside breeding period. Also uses derelict mines, storm-water tunnels, buildings and other man-made structures. Hunts in forested areas, catching moths and other flying insects above the tree tops.	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	NSW BC Act Vulnerable	Prefers moist habitat that contains trees greater than 20 m high with a dense undertstorey. They are fast flyers. Roosts in hollow trunks of eucalyptus trees, in colonies of 3 – 80. Also may roost in caves and old wooden buildings. This species changes roost every night. Roosts on consecutive nights are usually less than 750 m apart. This species has a home range of up to 136 ha (Churchill, S 2008, Australian Bats, Jacana Books, Crows Nest, NSW). Although they prefer habitat with a dense understorey, they prefer to forage along flyways	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.

		to avoid the thick understorey. They prefer continuous forest and avoid remnant vegetation. However, they have been recorded in open forests (Churchill, S 2008, Australian Bats, Jacana Books, Crows Nest, NSW).	
Eastern Freetail-Bat *Micronomus norfolkensis*	*Vulnerable NSW* BC *Act* Vulnerable *EPBC Act*	Small tree hollows/fissures in bark for roosting in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.
Greater Broad-nosed Bat *Scoteanaux ruepelli*	Vulnerable *NSW* BC *Act*	Found mainly in gullies and river systems that drain the Great Dividing Range, it utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, below 500m, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.
Large –eared Pied Bat *Chalinobolus dwyeri*	Vulnerable *NSW* BC *Act* Vulnerable *EPBC Act*	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required..

		elevation dry open forest and woodland close to these features	
Southern Myotis (Large-footed Myotis) *Myotis macropus*	Vulnerable *NSW* BC *Act*	This species is predominantly roosts in caves, however, is known to roost in trees and man-made structures close to water. Roosts are generally located close to water, where the bats forage in small groups of three or four. They have a strong association with streams and permanent waterways in areas that are vegetated rather than cleared (Churchill, S 2008, Australian Bats, Jacana Books, Crows Nest, NSW They feed on small fish, prawns and aquatic macroinvertebrates. They have a preference towards large still pools, rather than flowing streams. They will also forage an aerial insects flying over water. They use their large feet to capture prey items (Churchill 2008).	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	Vulnerable *NSW* BC *Act*	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.

BIRDS			
Black Bittern *Ixobrychus flavicollis*	Vulnerable *NSW* BC *Act*	Terrestrial and estuarine wetlands generally in areas of permanent water and dense vegetation that may comprise grassland, woodland forest rainforest and mangroves. Roosts in trees or on ground amongst dense reeds, nests in branches overhanging water	Unlikely to occur. No suitable habitat occurs within the site.
Black Falcon *Falco subniger*	*Vulnerable NSW* BC *Act*	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres (Marchant & Higgins 1993)	Possibly occurring transiently over the site. Unlikely to rely on habitat within the site. No important habitat would be removed or otherwise impacted.
Bush Stone-curlew *Burhinus grallarius*	NSW BC Act Endangered	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Nest on the ground in a scrape or small bare patch.	Unlikely to occur. No suitable habitat occurs within the site.
Caspian Tern *Hydroprogne caspia*	Migratory EPBC Act	Occur along the Australian coastline, and also occur inland along major rivers, especially in the Murray-Darling and Lake Eyre drainage basins, preferring wetlands with clear water to allow easy prey detection.	Unlikely to occur. No suitable habitat occurs within the site.
Dusky Woodswallow *Artamus cyanopterus cyanopterus*	Vulnerable NSW BC Act	The Dusky Woodswallow is often reported in woodlands is eastern, southern and southwestern Australia. In New South Wales it is widespread from coast to inland, including the	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.

		western slopes of the great Diving Range and farther west. It is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalyptus, including mallee associations. It have also been recorded in shrublands and heathlands and carious modified habitats including regenerating forests; very occasionally in moist forests of rainforests. At sites where Dusky Woodswallows are recorded the understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with course woody debris. Birds are often observed in farmland usually at the edges of forests, woodlands or in roadside remnants or wind breaks with dead timber. Nesting occurs from late September to late February, with eggs present between October and early December. They nest in an open shallow untidy cup, frequently in an open hollow, crevice or stump.	
Eastern Bristlebird- *Dasyornis brachypterus*	Endangered EPBC Act Endangered NSW BC Act	Sedgeland/heathland/dry sclerophyll and woodlands- / requires thick shrub/heath layer for shelter, nesting and foraging	Unlikely to occur. No suitable habitat occurs within the site.
Eastern Curlew *Numenius madagascariensis*	Critically Endangered *EPBC Act*	Most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats	Unlikely to occur. No suitable habitat occurs within the site.

		fringed by mangroves, and sometimes use the mangroves. The birds are also found in saltworks and sewage farms (Marchant & Higgins 1993). The numbers of Eastern Curlew recorded during one study were correlated with wetland areas. Mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. The birds are rarely seen on near-coastal lakes and in grassy areas. Roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. It occasionally roosts on reef-flats, in the shallow water of lagoons and other near-coastal wetlands. Eastern Curlews are also recorded roosting in trees and on the upright stakes of oyster-racks. At Roebuck Bay, Western Australia, birds fly from their feeding areas on the tidal flats to roost 5 km inland on a claypan. In some conditions, waders may choose roost sites where a damp substrate lowers the local temperature. This may have important conservation implications where these sites are heavily disturbed beaches. It may be possible to create artificial roosting sites to replace those destroyed by development. Eastern Curlews typically roost in large flocks, separate from other waders.	

Eastern Osprey *Pandion cristatus*	*NSW* BC *Act* Vulnerable	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Possibly occurring transiently over the site. Unlikely to rely on habitat within the site. No important habitat would be removed or otherwise impacted.
Freckled Duck *Stictonetta naevosa*	Vulnerable NSW BC Act	found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds	Unlikely to occur. No suitable habitat occurs within the site.
Gang-gang Cockatoo *Callocephalon fimbriatum*	*Vulnerable NSW* BC *Act*	Tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.

		coastal areas. Favours old growth attributes for nesting and roosting	
Glossy Black-cockatoo *Calyptorhynchus lathami*	Vulnerable *NSW* BC *Act*	The GBC inhabits open forest and woodlands of the coast where stands of she-oak occur. In the Jervis Bay region they feed almost exclusively on the seeds of the black she-oak *Allocasuarina littoralis*, shredding the cones with their bill	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.
Little Lorikeet *Glossopsitta pusilla*	Vulnerable NSW BC ACT	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like Allocasuarina	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.

Masked Owl – *Tyto novaehollandiae*	Vulnerable *NSW* BC *Act*	Dry eucalypt forests and woodlands from sea level to 1100 m. Inhabits forest but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Requires old growth elements-hollow bearing tree resources for nesting and prey source.	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.
Olive Whistler *Pachycephala olivacea*	Vulnerable *NSW* BC *Act*	The Olive Whistler inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. In the south it is found inland to the Snowy Mountains and the Brindabella Range. Mostly inhabit wet forests above about 500m. During the winter months they may move to lower altitudes. Forage in trees and shrubs and on the ground, feeding on berries and insects. Make nests of twigs and grass in low forks of shrubs. Lay two or three eggs between September and January.	Unlikely to occur. No suitable habitat occurs within the site.
Powerful Owl *Ninox strenua*	Vulnerable NSW BC Act	Coastal Woodland, Dry Sclerophyll Forest, wet sclerophyll forest and rainforest- Can occur in fragmented landscapes Roosts in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia*	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.

		melanoxylon, Rough-barked Apple *Angophora floribunda,* Cherry Ballart Exocarpus cupressiformis and a number of eucalypt species. requires old growth elements-hollow bearing tree resources for nesting and prey resource. Nests in large tree hollows in large eucalypts that are at least 150yrs old. Often in riparian areas. Large home range	
Regent Honeyeater *Anthochaera phrygia*	Critically endangered EPBC Act Critically endangered NSW BC Act	Temperate woodlands and open forests- and drier coastal woodlands in some years (flowering coastal woodlands and forests including box-ironbark woodland, and riparian forests-that exhibit large numbers of mature trees, high canopy cover and abundance of mistletoes) Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises: Eucalyptus microcarpa, E. punctata, E. polyanthemos, E. moluccana, Corymbia robusta, E. crebra, E. caleyi, C. maculata, E.mckieana, E. macrorhyncha, E. laevopinea, and Angophora floribunda. Nectar and fruit from the mistletoes Amyema miquelii, A. pendula and A. cambagei are also eaten during the breeding season.	Unlikely to occur. No suitable habitat occurs within the site.
Scarlet Robin *Petroica boodang*	Vulnerable *NSW* BC *Act*	The Scarlet Robin is primarily a resident in dry forests and woodlands, but some adults and young birds disperse to more open habitats after breeding.	Unlikely to occur. No suitable habitat occurs within the site.
Sooty Owl *Tyto tenebricosa*	Vulnerable *NSW* BC *Act*	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests	Unlikely to occur. No suitable habitat occurs within the site.

Spotted Harrier *Circus assimilis*	Vulnerable *NSW* BC *Act*	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats or the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population.	Possibly occurring transiently over the site. Unlikely to rely on habitat within the site. No important habitat would be removed or otherwise impacted.
Square-Tailed Kite *Lophoictinia isura*	*Vulnerable NSW* BC *Act*	Summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses large hunting ranges of more than 100km2 Nest within large hollow bearing trees generally within 200m of riparian areas.	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.
Varied Sittella *Daphoenositta chrysoptera*	Vulnerable *NSW* BC *Act*	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.
Wedge-tailed Shearwater *Ardenna pacificus*	Migratory *EPBC Act*	A pelagic, marine bird known from tropical and subtropical waters. The species tolerates a range of surface-temperatures and salinities, but is most abundant where temperatures are greater than 21 °C and salinity is greater than 34.6 %. In tropical zones the species may feed over cool nutrient-rich waters. The species has been recorded in offshore waters of eastern Victoria and southern NSW, mostly over continental slope with sea-surface temperatures of 13.9–24.4 °C and usually off the continental shelf in north-west Australia.	Unlikely to occur. No suitable habitat occurs within the site.

White-bellied Sea-Eagle *Haliaeetus leucogaster*	*NSW* BC *Act* Vulnerable Migratory *EPBC Act*	Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterized by the presence of large areas of open water (larger rivers, swamps, lakes, the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats. The species is mostly recorded in coastal lowlands, but can occupy habitats up to 1400 m above sea level on the Northern Tablelands of NSW and up to 800 m above sea level in Tasmania and South Australia. Birds have been recorded at or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs, saltmarsh and sewage ponds. They also occur at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest (including rainforest) and even urban areas. Breeding has been recorded on the coast, at inland sites, and on offshore islands. Breeding territories are located close to water, and mainly in tall open forest or woodland, although nests are sometimes located in other habitats such as dense forest (including rainforest), closed scrub or in remnant trees on cleared land. Forages over large expanses of open water; this is particularly true of birds that occur in coastal environments close to the sea-shore, where they forage over in-shore waters. However, the White-	Possibly occurring transiently over the site. Unlikely to rely on habitat within the site. No important habitat would be removed or otherwise impacted.

		bellied Sea-Eagle will also forage over open terrestrial habitats (such as grasslands). Birds may move to and congregate in favorable sites during drought or food shortage.	
White-fronted Chat *Epthianura albifrons*	Vulnerable NSW BC Act	Commonly occurring in the saltmarshes of southern Australia, the White-fronted Chat is often seen foraging for insects and their larvae among the succulent leaves and stems of stunted saltmarsh plants.	Unlikely to occur. No suitable habitat occurs within the site.
MAMMALS			
Brush-tailed Rock-wallaby *Petrogale penicillata*	NSW BC Act Endangered EPBC Act Vulnerable	Occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night. Highly territorial and have strong site fidelity with an average home range size of about 15 ha.	Unlikely to occur. No suitable habitat occurs within the site.
Eastern Pygmy-possum *Cercatetus nanus*	Vulnerable NSW BC Act	Rainforest, sclerophylla forest & woodland to heath – but heath & woodland preferred. Forages on banksias, eucalypts & bottlebrushes.	Unlikely to occur. No suitable habitat occurs within the site.

Greater Glider *Petauroides Volans*	Vulnerable EPBC Act	Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Shelter during the day in tree hollows and will use up to 18 hollows in their home range. Occupy a relatively small home range with an average size of 1 to 3 ha. Give birth to a single young in late autumn or early winter which remains in the pouch for approximately 4 months and is independent at 9 months of age. Usually solitary, though mated pairs and offspring will share a den during the breeding season and until the young are independent. Can glide up to a horizontal distance of 100m including changes of direction of as much as 90 degrees. Very loyal to their territory.	Unlikely to occur. No suitable habitat occurs within the site.
Grey-headed Flying-fox *Pteropus poliocephalus*	Vulnerable *EPBC Act* Vulnerable *NSW BC Act*	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.
Parma Wallaby *Macropus parma*	NSW BC Act Vulnerable	Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest.	Unlikely to occur. No suitable habitat occurs within the site.
Southern Brown Bandicoot (eastern) *Isoodon obesulus obesulus*	Endangered EPBC Act Endangered NSW BC Act	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-	Unlikely to occur. No suitable habitat occurs within the site.

		bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees Xanthorrhoea spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest.	
Spotted-tailed Quoll *Dasyurus maculatus*	Endangered *EPBC Act* Vulnerable *NSW BC Act*	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground, although also an excellent climber and will hunt possums and gliders in tree hollows and prey on roosting birds. Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. Such sites may be visited by multiple individuals and can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals. Females occupy home ranges up to about 750 hectares and males up to 3500 hectares. Are	Unlikely to occur. No suitable habitat occurs within the site.

		known to traverse their home ranges along densely vegetated creeklines.	
Yellow-bellied Glider - *Petaurus Australis*	Vulnerable *NSW* BC *Act*	Forest with old growth elements. Large Eucalypt Hollows for denning- Inhabits mature or old growth Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia mid storey. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein. Extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar. Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.	Possibly occurring within the site. May utilise foraging and roosting habitat within the site. Further assessment required.

APPENDIX C

AHIMS Web Services Extensive Search – Site List Report

Shoalhaven City Council

Review of Environmental Factors
Part 5 Assessment EP&A Act 1979

Office of Environment & Heritage NSW GOVERNMENT

AHIMS Web Services (AWS)
Extensive search - Site list report

Your Ref/PO Number : Moss Vale URA Sewer
Client Service ID : 540454

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
52-5-0541	BCRP 005 Leaning Cliff-Line Site	GDA	56	279983	6140798	Closed site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0580	PASA45	GDA	56	280118	6142323	Open site	Not a Site	Potential Archaeological Deposit (PAD) : 1		102506
	Contact	Recorders	Mr.Kelvin Officer,Mr.Adrian Cressey					Permits	3791	
52-5-0564	G2BA1	GDA	56	280171	6142391	Open site	Destroyed	Artefact : 1		103068
	Contact	Recorders	Mr.Kelvin Officer,Artefact - Cultural Heritage Management - Pyrmont,Mr.Alex Timn					Permits	3791	
52-5-0753	G2B A61	GDA	56	280248	6142928	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		103718
	Contact	Recorders	Mr.Adrian Cressey					Permits	3791	
52-5-0712	PASA 52	GDA	56	280341	6143016	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		103068
	Contact	Recorders	Mr.Adrian Cressey,Mr.Adrian Cressey					Permits	3791	
52-5-0752	G2B A60	GDA	56	280375	6143357	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		103718
	Contact	Recorders	Mr.Adrian Cressey					Permits	3791	
52-5-0683	PASA 1 (Berry - Bomaderry)	GDA	56	280412	6143352	Open site	Valid	Potential Archaeological Deposit (PAD) : -		103068
	Contact	Recorders	Mr.Kelvin Officer,Mr.Adrian Cressey					Permits	3791,4067	
52-5-0754	Abernethy's Creek 1	GDA	56	280423	6143083	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Mr.Adrian Cressey					Permits		
52-5-0751	G2B A59	GDA	56	280458	6143469	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Mr.Adrian Cressey					Permits	3791	
52-5-0287	Abernethys Creek 1;	GDA	56	280464	6142990	Open site	Partially Destroyed	Artefact : -	Open Camp Site	102301,102506
	Contact	Recorders	Mr.Kelvin Officer,Mr.Matthew Kelleher,Mr.Matthew Kelleher,Kelleher Nightingale (					Permits	3791	
52-5-0840	MM-AD1	GDA	56	280517	6143246	Open site	Valid	Artefact : -		
	Contact	Recorders	Biosis Pty Ltd - Sydney,Mr.James Cole					Permits	4067	
52-5-0838	Abernethys Creek 2	GDA	56	280581	6143181	Open site	Valid	Artefact : -		
	Contact	Recorders	Biosis Pty Ltd - Sydney,Mr.James Cole					Permits	4067	

Report generated by AHIMS Web Service on 07/10/2020 for Jeff Bryant for the following area at Datum :GDA, Zone : 56, Eastings : 278740 - 282139, Northings : 6140752 - 6143495 with a Buffer of 50 meters. Additional Info : Due diligence assessment. Number of Aboriginal sites and Aboriginal objects found is 39

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Shoalhaven City Council

Review of Environmental Factors
Part 5 Assessment EP&A Act 1979

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Extensive search - Site list report

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Client Service ID : 540454

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
52-5-0839	MM-AD2	GDA	56	280671	6143226	Open site	Valid	Artefact : -		
	Contact	Recorders	Biosis Pty Ltd - Sydney,Mr.James Cole					Permits	4067	
52-5-0694	EDWARDS AVENUE IF1	GDA	56	281938	6142393	Open site	Valid	Artefact : 1		
	Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont					Permits		
52-5-0544	BCRP 012 Pitt Street Narang	AGD	56	278907	6141032	Open site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0545	BCRP 013 West Cambewarra	AGD	56	279206	6141669	Open site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0546	BCRP 014 West Cambewarra	AGD	56	279266	6141794	Open site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-2-1797	West Cambewarra Rd.;Bomaderry Creek;	AGD	56	279300	6141700	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	98511,103143
	Contact	Recorders	T Bartlett					Permits		
52-5-0390	Bomaderry Site	AGD	56	279350	6141300	Open site	Valid	Artefact : -		2254,98511,102506,103143
	Contact	Recorders	Terry Barratt					Permits		
52-5-0263	Bomaderry Ck 4;Bomaderry Creek Nowra;	AGD	56	279350	6141400	Closed site	Valid	Artefact : -	Shelter with Deposit	2254,98511,102506,103143
	Contact	Recorders	Kerry Navin,Mr.Kelvin Officer					Permits		
52-5-0421	NO.LC1	AGD	56	279350	6143000	Open site	Valid	Artefact : 4		102301,102506
	Contact	Recorders	Mr.Sam Wickman					Permits		
52-5-0262	Bomaderry Ck 5;Bomaderry Creek Nowra;	AGD	56	279420	6141260	Closed site	Valid	Artefact : 5	Shelter with Deposit	2254,98511,102506,103143
	Contact	Recorders	Kerry Navin,Mr.Kelvin Officer,Mr.Edward Clarke					Permits		
52-5-0454	BC1/B	AGD	56	279450	6141160	Closed site	Valid	Artefact : 8		102506,103143
	Contact T Russell	Recorders	Mr.Edward Clarke					Permits		
52-5-0547	BCRP 015 West Cambewarra	AGD	56	279472	6141712	Open site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0556	BCRP 025 Trenched Drip-line	AGD	56	279496	6141091	Open site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0542	BCRP 006 Pipeline Shelter	AGD	56	279545	6141313	Closed site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0543	BCRP 007 Stone Circle Site	AGD	56	279551	6141181	Open site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0555	BCRP 024 One Silcrete Flake	AGD	56	279675	6141006	Open site	Valid	Artefact : 1		102506

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Review of Environmental Factors
Part 5 Assessment EP&A Act 1979

Office of Environment & Heritage NSW GOVERNMENT

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Moss Vale URA Sewer
Client Service ID : 540454

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0539	BCRP 002 The black caves	AGD	56	279701	6141045	Open site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0554	BCRP 023 Charcoal Oval Art	AGD	56	279757	6140987	Open site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0538	BCP 001 Mosquito Shelter	AGD	56	279793	6141045	Closed site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0552	BCRP 020 Spotted Gum	AGD	56	279868	6140699	Closed site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0389	Shelter Cave	AGD	56	279900	6140800	Open site	Valid	Habitation Structure : -		98511,102506, 103143
	Contact	Recorders	Terry Barratt					Permits		
52-5-0553	BCRP 022-30 Metres West of Shelter Cave	AGD	56	279917	6140870	Closed site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0453	BC1/E	AGD	56	279930	6141030	Closed site	Valid	Artefact : 6		102506,103143
	Contact T Russell	Recorders	Mr.Edward Clarke					Permits		
52-5-0540	BCRP 003 The blue metal site	AGD	56	279952	6141083	Open site	Valid	Artefact : -		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0455	BC1/F	AGD	56	279970	6140860	Closed site	Valid	Artefact : 1		102506
	Contact T Russell	Recorders	Mr.Edward Clarke					Permits		
52-5-0551	BCRP 019 Boulder Shelter	AGD	56	280000	6140599	Closed site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		
52-5-0557	BCRP 026 Rock Fall Canyon Shelter	AGD	56	281896	6140560	Closed site	Valid	Artefact : 1		102506
	Contact	Recorders	Kelleher Nightingale Consulting Pty Ltd					Permits		

Report generated by AHIMS Web Service on 07/10/2020 for Jeff Bryant for the following area at Datum :GDA, Zone : 56, Eastings : 278740 - 282139, Northings : 6140752 - 6143495 with a Buffer of 50 meters. Additional Info : Due diligence assessment. Number of Aboriginal sites and Aboriginal objects found is 39

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

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APPENDIX D

AHIMS Site Card aerial maps

Figure D-1. Site 52-5-0302

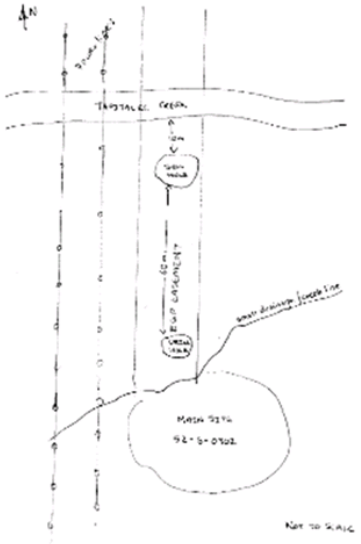
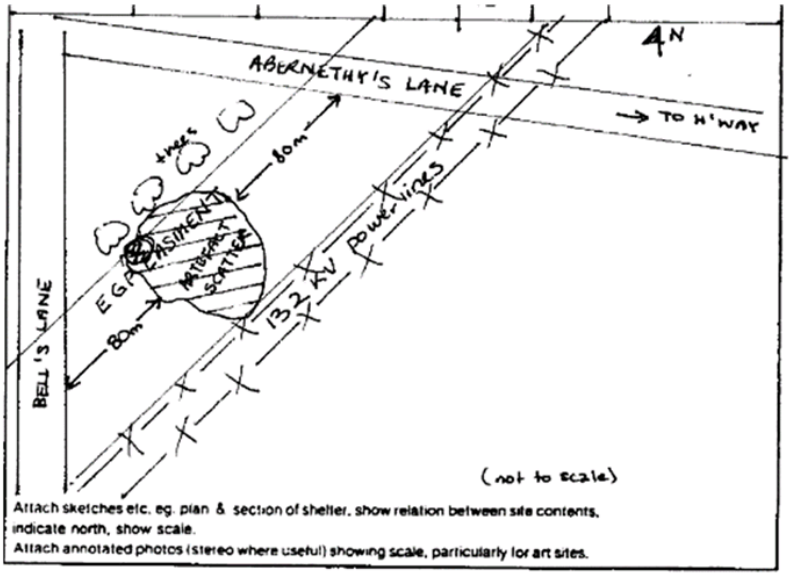


Figure D-2. Site 52-5-0421



Attach sketches etc. eg. plan & section of shelter, show relation between site contents, indicate north, show scale.
Attach annotated photos (stereo where useful) showing scale, particularly for art sites.

Figure D-3. Site 52-5-0694

Figure D-4. Sites 52-5-0712, 52-5-0753 and 52-5-0754

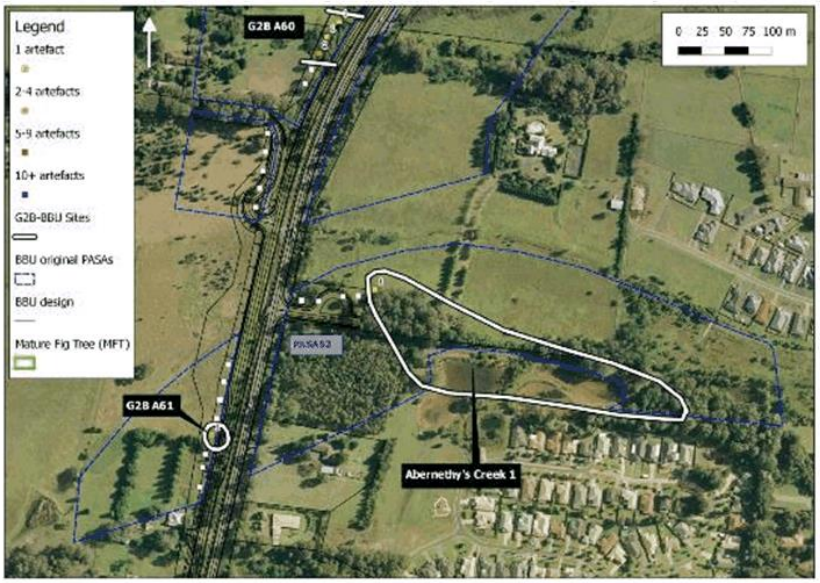


Figure D-5. Site 52-5-0839

Figure D-6. Site 52-5-0840

Figure D-7a. Sites 52-5-9031, 52-5-0932 and 52-5-0933 (from Feary 2020)

Figure 17: Test pit locations in relation to the road alignment

Table D1. Sites 52-5-9031, 52-5-0932 and 52-5-0933 (from Feary 2020)

AREA	TEST PIT #	DEPTH OF PIT (Datum 20cm)	NO. OF ARTEFACTS	EXCAVATION UNIT WITH ARTEFACTS	DEPTH RANGE OF ARTEFACTS
C	NN1	46.5	0		
C	NN2	42.0	0		
A	NN3	43.5	0		
A	NN4	43.0	1	Spit 3	20-30 cm
A	NN5	45.0	3	Spit 3	10-15 cm
A	NN6	32.0	2	Spit 2 and 3	10-30 [disturbed]
A	NN7	40.0	0		
A	NN8	39.0	3	Spit 2	10-15
A	NN12	49.0	1	Spit 3/4	20-25
B	NN9	43.0	1	Spit 4	20-30
B	NN10	35.0	0		
B	NN11	47.0	1	Spit 3	10-20
TOTAL ARTEFACTS = 12					

Figure D-7b. Site 52-5-9031 (from Feary 2020)

Figure D-7b. Site 52-5-9031 (from Feary 2020)