Karehana Stormwater Catchment Recommendation

Porirua City Council Meeting – 19 October 2023

Version: 6 October 2023_v3

Our water, our future.

Purpose

1) The purpose of this paper is to:

   a) provide Porirua City Council with an update on the current recommended scope of works for the Karehana Stormwater Catchment project, revised estimate for the works and proposed phased approach to the works.

   b) seek approval to proceed with phase 1 of the current recommended scope of works (Option 2.1).

Recommendation

2) It is recommended that Porirua City Council:

   a) note that the full scope of the current recommended scope of works (Option 2) is required to achieve the full benefits of the project (this work will benefit approximately 18-19 habitable floors in a 30yr rainfall event).

   b) approve works to proceed with phase 1 of the current recommended scope of works (Option 2.1), within the current approved budget to the value of $9.6M - $12.5M (this work will benefit approximately 6 habitable floors in a 30yr rainfall event).

   c) note Wellington Water will be seeking additional funding through the LTP process to complete the remainder of the works to complete Option 2.

Background

3) The provision of a stormwater service aims to efficiently manage and control flows to support the Council's goals of protecting the public and property from the effects of frequent flooding.

4) The Plimmerton area in Porirua has experienced major flooding events over the past five years (2015, 2016 and 2020) with numerous residential properties requiring extensive renovations to make them fit for habitable purposes.

5) At a community meeting held in January 2021 Porirua City Council and Wellington Water committed to undertake catchment level investigations to develop options to mitigate the flooding impacts for the Karehana, Taupo/James St and Hongoeka Catchments.

6) While we are only seeking a decision for the Karehana catchment in this paper, as the catchment study is well progressed in this area and where funding commitments have been made, substantial areas of Porirua are at risk of flooding during extreme rain events and work is still required to develop the other stormwater catchment studies to address broader flood risk. Additional Opex budget is also required to develop the catchment studies in these areas and establish what works may be required.

7) *Figure 1: Porirua Flooding Risks*

North
- Hongoeka Flooding
- Karehana Park Flooding
- Taupo- Plimmerton Flooding
- School Road Flooding
- Pope St/SH59 Flooding
- Acheron Flooding
- SH59/New world Paremata Flooding
- Paremata Flooding

West
- Te Pene Avenue OLFP obstruction
- Main Road/Waihora Park Flooding
- John St flooding
- Whitehouse Road Flooding
- Takapuwahia Flooding
- Porirua CBD Flooding

South
- Kenepuru Drive SW Improvements
- Wall Place Flooding
- Eskdale/Conclusion Flooding

East
- Duck Creek Flooding
- Paremata School Flooding
- Papakowhai Flooding
- Warspite/Conclusion St/Omapere St Flooding
- Niagara St/Loongana St Flooding
- Kalingo St Flooding
- Waihora Crescent Flooding
- Matahourua Crescent and Maraeroa School Flooding
- Champion St Flooding
- Mungavin Avenue Flooding
- Martin St Flooding
- Princess St Flooding

Karehana Catchment

8) The Karehana Stormwater Management and Improvements Study was initiated in February 2021 to identify possible long-term stormwater management options to reduce flooding in the Karehana Park catchment.

9) The primary goals of the long-term solution were:
   - to minimise the impact of flooding on people's lives and proactively plan for the impacts of climate change (to reduce the number of habitable floors affected by frequent flooding)
   - to minimise public health risks associated with wastewater and stormwater (to reduce the number of uncontrolled wet weather overflows onto land.)

10) The catchment study and options assessment for the Karehana catchment was completed in August 2021.

11) The following challenges with the network and catchment were identified during this study:
   - low network capacity with frequent debris blockages
   - small steep catchment
   - very developed and low-lying properties

12) Due to these challenges it was determined that protection from a full 100-year flood event would not be achievable.

13) In November 2021, the recommended package of works and budget to provide flood protection to habitable floors to a target 30-year flood event for the Karehana catchment was approved by Porirua City Council.

14) Noting that a 30-year flood event represents a 1 in 30 chance of the event occurring each year.

15) The estimated cost of the approved works was $16.9M.

Options

16) The concept design phase for the Karehana Stormwater Improvements project is now complete.

17) During the concept design phase, the scope and extent of works required in each "package" has been defined using more detailed site-specific information including detail survey and a beach morphology study.

18) A revised cost estimate and recommended funding risk for the scope of these works has also been prepared.

19) The hydraulic modeling has been updated with all the "new" site specific information gathered during concept design and this has been used to:
    - confirm the expected benefits of the original recommended scope
    - determine what optimisation to the original recommended scope could provide similar benefit

20) Approximately 25 habitable floors were affected during the November 2020 flood event, which was estimated to be similar to a 30-year flood event. This is expected to increase to 30 – 40 habitable floors affected with climate change.

Option 1: Original Recommendation

21) In 2021, during the optioneering, Option 1 was found to protect the most habitable floors in a 30-year event.

22) This option focuses on all three areas of the catchment and provides improvements around Karehana Park, upstream of Firth Road, and to the eastern side of the valley (Cluny Road and Reserve Road).

23) During the optioneering phase a base estimate was provided of $16M for the package of works required across the catchment. The optioneering phase estimate was based on the expected "type" of work expected in each area at preliminary sizes. This was the original scope of works approved by Porirua City Council in 2021 for a budget of $16.9M, with multiple packages of work up the catchment.

24) During the concept design additional investigation works were undertaken with more clarity on the extent and size of works required for each package. Contractor advice was also sought on constructability and possible construction methodologies. Concept design risk assessments have also taken place. The stream works were identified as very challenging with the extent of infrastructure built right up to the stream channel, given extremely limited access and construction space. This has meant the estimate has increased up to $56M at concept design (including risk and contingency funding).

25) *Figure 2: Option 1 Original Recommendation*

26) *Table 1: Option1 Original Recommendation Benefits & Revised Estimate*

Concept Design Capital Estimate	$43M - $56M
Estimate/Floor (Current 30yr rainfall event)	$2.4M - $3.1M
Habitable Floors Benefit (Current 30yr rainfall event)	~ 18
Habitable Floors Benefit (30yr rainfall event with climate change)	~ 19
Habitable Floors Benefit (100yr rainfall event - current)	~ 25

Option 2: Current Recommendation

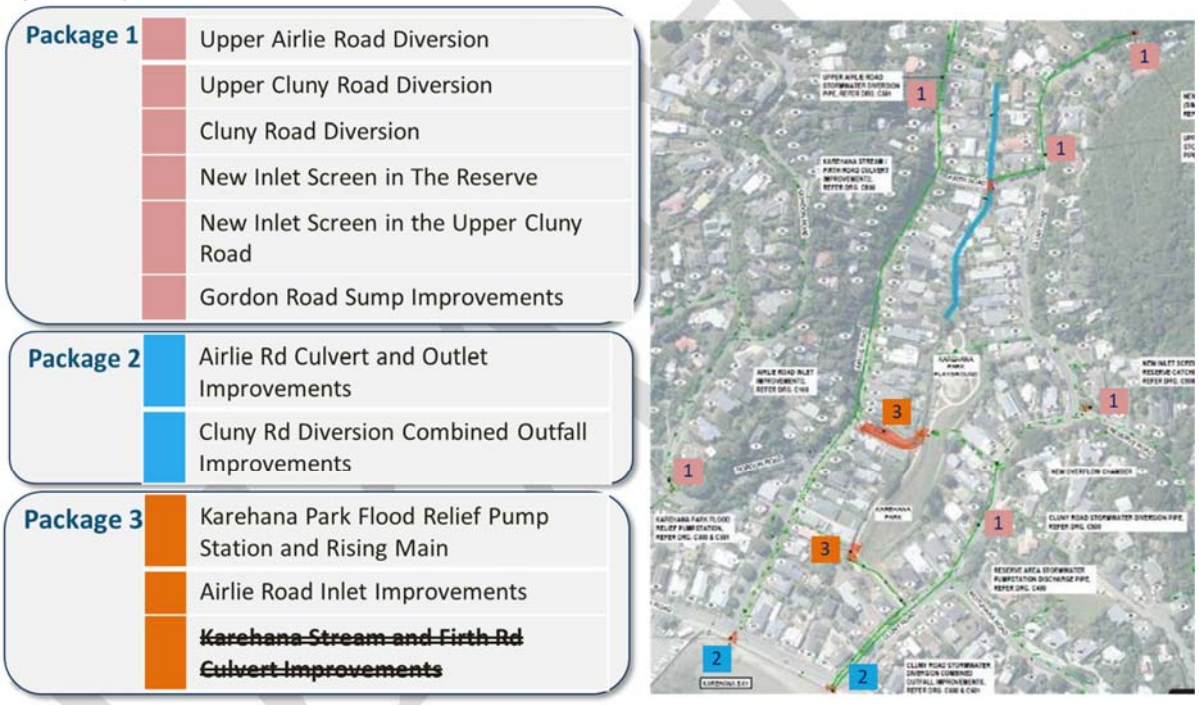
27) Option 2 represents an optimisation of the original recommended scope.

28) During the concept design more detailed survey and investigation work was undertaken and it was determined that similar benefits may be achieved without the need to upgrade the stream upstream of the park.

29) The removal of the streamworks upstream of the park removes substantial risk to the project and is more cost effective with similar benefits to the original recommended option.

30) The capital estimate for these works at concept design is $32M - $41M (including risk and contingency funding).

31) *Figure 3: Option 2 Current Recommendation*



32) *Table 2: Option 2 Current Recommendation Benefits & Estimate*

Concept Design Capital Estimate	$32M - $41M
Estimate/Floor (Current 30yr rainfall event)	$1.7M - $2.2M
Habitable Floors Benefit (Current 30yr rainfall event)	~ 19
Habitable Floors Benefit (30yr rainfall event with climate change)	~ 18
Habitable Floors Benefit (100yr rainfall event - current)	~ 19

Option 2.1: Current Recommendation Phase 1

33) Option 2.1 represents a phased approach to the Current Recommended Option (Option 2) within the current LTP budget.

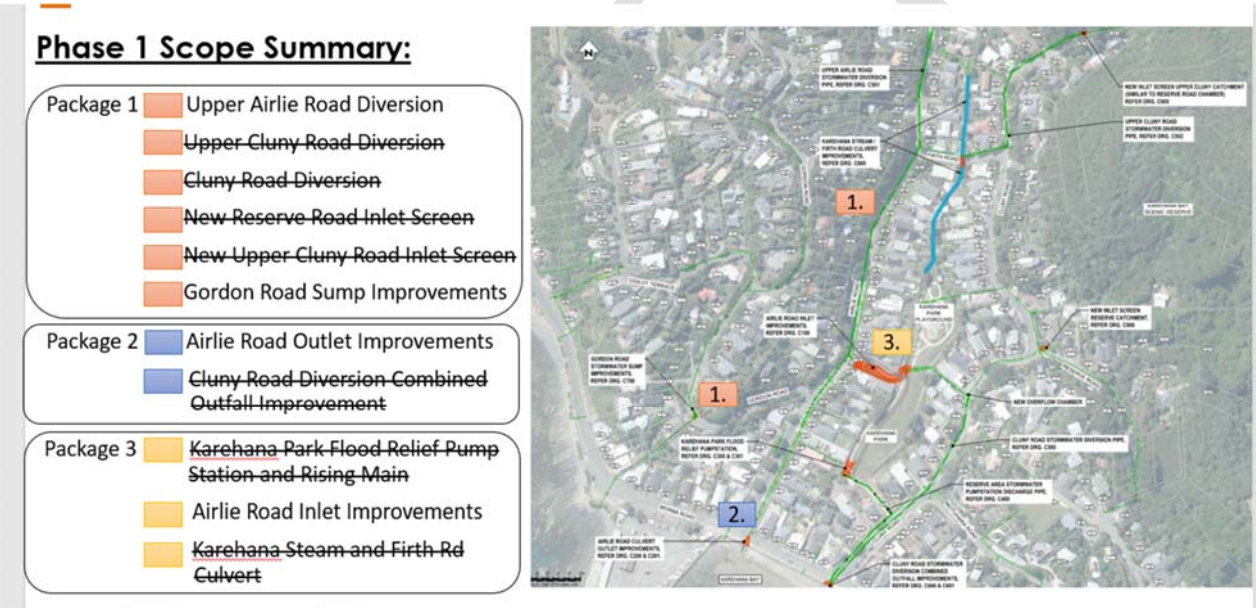
34) Option 2.1 represents only the first phase of Option 2: Current Recommendation. It is still recommended that the full scope of Option 2 is completed following Phase 1 to achieve the benefits.

35) Option 2.1 scope includes the complete detail design and consenting of the Current Recommended Option (Option 2) with only the first phase of physical works constructed.

36) Phase 1 physical works includes the Upper Airlie Rd Diversion, Airlie RD inlet and outlet, as well as Gordon Rd Sump Improvements.

37) The capital estimate for these works at concept design is $9.6M - $12.5M (including risk and contingency funding).

38) *Figure 3.1: Option 2.1 Current Recommendation Phase 1*



39) *Table 2.1: Option 2.1 Current Recommendation Phase 1 Benefits & Estimate*

Concept Design Capital Estimate	$9.6M - $12.5M
Estimate/Floor (Current 30yr rainfall event)	$1.6M - $2.1M
Habitable Floors Benefit (Current 30yr rainfall event)	~ 6
Habitable Floors Benefit (30yr rainfall event with climate change)	~ 1

Option 3: "Do Nothing"

40) We had reports of approximately 25 properties impacted by flooding in 2020 (approximately a 30-year flood event). The modeling has indicated that this is expected to grow to between 30-40 properties impacted in a 30yr event with climate change applied, without intervention.

41) The service level of maintenance required at Karehana Bay continues to be operationally more challenging and more frequent than in other hotspots in the network. Currently, operational resources are allocated specifically to Karehana Bay/Plimmerton in preparation, during and after rainfall events, resulting in resources not attending other hotspots and callouts across the network.

42) High tides and blocking of the main stormwater outlets continue to be the main operational challenge with the sand being dug out and or checked at least 3 times weekly. Due to the nature of the network and possible blockages in the network properties may be at risk below a in events below a 1 in 30 yr event.

43) In the event of high tide coinciding with rainfall the temporary pump currently located at the outlet is operated. It should be noted that the pump was only ever intended to be a short-term operational response to be used in emergencies, but this has been operated for 268 hours between May 2022 and April 2023. The "temporary" pump setup is likely unpermitted in the long term if works are deferred. Either a consent would need to be considered for the pump at the outlet or the pump removed completely.

44) Currently operational costs in this area are $70,000- $100,000/yr (excluding any post flood cleanup or damage costs).

45) From an operational point of view a long-term solution is required at Karehana Bay as the current setup and operational response required in the area is not sustainable beyond another 1 -2 years.

46) This option is not recommended.

Options Summary

47) Table 3: Options Summary Benefits & Estimates

	Option 1: Original Recommendation	Option 2: Current Recommendation	Option 2.1: Current Recommendation Phase 1 Only
Concept Design Capital Estimate	$43M - $56M	$32M - $41M	$9.6M - $12.5M
Estimate/Floor (Current 30yr rainfall event)	$2.4M - $3.1M	$1.7M - $2.2M	$1.6M - $2.1M
Habitable Floors Benefit (Current 30yr rainfall event)	~ 18	~ 19	~ 6
Habitable Floors Benefit (30yr rainfall event with climate change)	~ 19	~ 18	~ 1
Habitable Floors Benefit (100yr rainfall event - current)	~ 25	~ 19	-

48) The cost estimate is currently at concept design level with associated risk funding in line with this level of estimate. This is based on the best information we have available at this stage. The estimates do not include escalation.

49) Operationally (for a similar run time as the temporary pump station) we expect the operational and maintenance costs of the new pumps to be between $25k – $40k/year. With Inlet and channel clearance costs in the order of $40k - $50k/year. However, this will vary depending on the size and number of storm water and tidal events.

Cashflow

50) The 2021 Long-term Plan included a total of $20M for major stormwater projects across the city

51) Table 4: Current LTP Budget

Area	22/23	23/24	24/25	25/26
Plimmerton	$10M	$10M		

52) Noting that $1M was allocated for use by PCC for catch nets. Resulting in $19M available for work by Wellington Water.

53) The current estimated cashflow forecast for Karehana projects following a phased approach is:

54) Table 5: Current Indicative Phased Cashflow

CAPEX	LOS	Benefits	Total	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29
Karehana Total	**30yr**	**20+ floors**	**41,292,000.00**	306,000.00	$797,000	$2,322,000	$5,410,000	$13,678,000	$6,253,000	$6,264,000	$6,262,000
Stage 1 (Including Stage 2 Design & Consenting)			*12,475,500.00*	*306,000.00*	*$797,000*	*$2,322,000*	*$5,410,000*	*3,640,500.00*			
Stage 2 Physical Works			*28,816,500.00*					*10,037,500.00*	*$6,253,000*	*$6,264,000*	*$6,262,000*

55) This cashflow is based on a sequential approach. With Stage 1 (within the current budget) physical works completed while additional funds are sought for Stage 2.

* Stage 1: Start November 2021 - Complete December 2025.

* Stage 2: Start September 2025 - Complete June 2029.

56) This cashflow is subject to Porirua City Council Annual Plan and Long-Term Plan funding processes.

Recommendation

57) In conclusion it is recommended that Porirua City Council:

a) note that the full scope of the current recommended scope of works (Option 2) is required to achieve the full benefits of the project (this work will benefit approximately 19 habitable floors in a 30yr rainfall event).

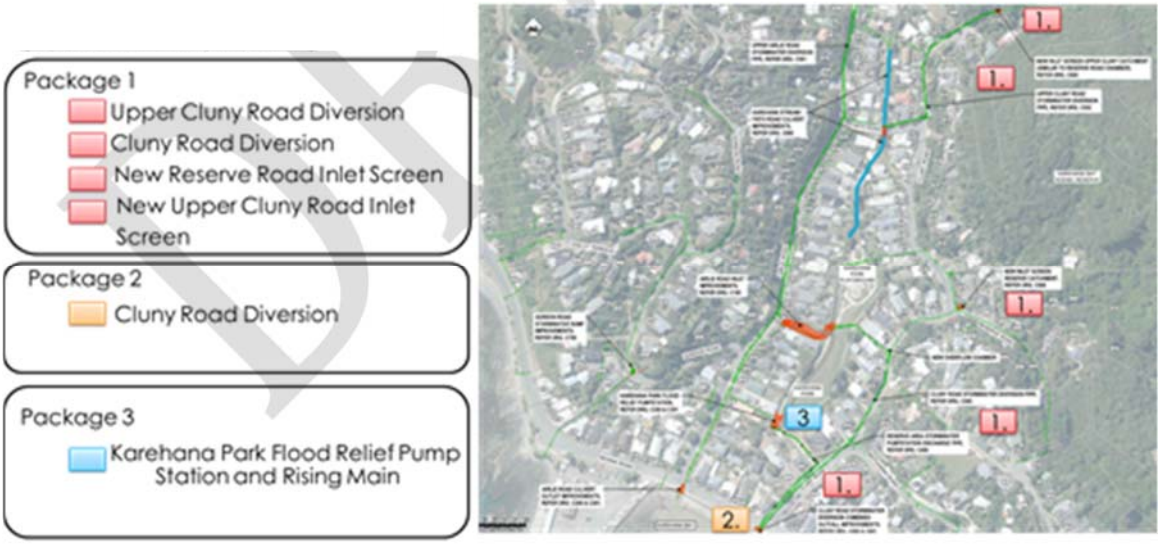
b) approve works to proceed with phase 1 of the current recommended scope of works (Option 2.1), within the current approved budget to the value of $9.6M - $12.5M (this work will benefit approximately 6 habitable floors in a 30yr rainfall event).

c) note Wellington Water will be seeking additional funding through the LTP process to complete the remainder of the works to complete Option 2.

Appendix 1: Option 2: Stage 1 and 2

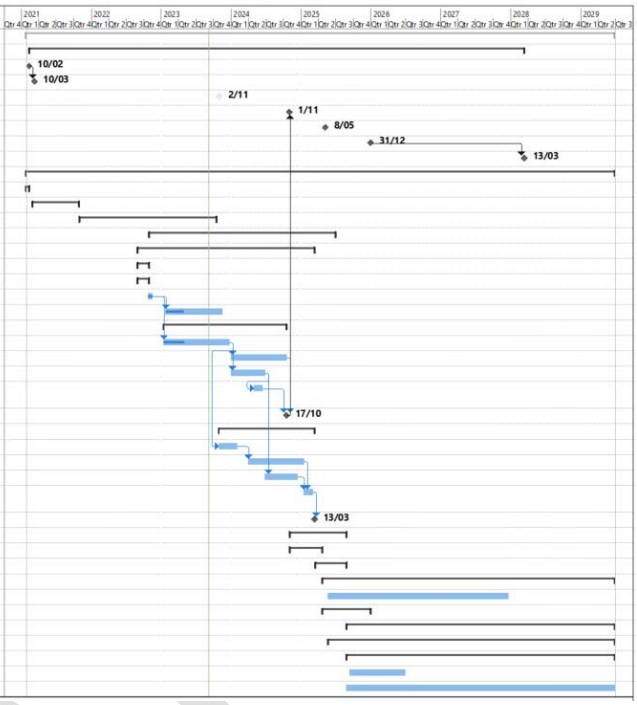
Phase 1 (Stage 1):

Phase 2 (Stage 2):



Appendix 2: Phased Programme

ID	% Complet	Task Name	Start	Finish
0	15%	**Karehana SW Catchment exp 06.09.23**	Wed 27/01/21	Fri 29/06/29
1	0%	**Milestones**	Wed 10/02/21	Mon 13/03/28
2	100%	Gateway 1: Define Phase Complete	Wed 10/02/21	Wed 10/02/21
3	100%	Gateway 2: Plan Phase Complete	Wed 10/03/21	Wed 10/03/21
4	0%	~~Gateway 3: Concept Design Phase Complete~~	~~Thu 2/11/23~~	~~Thu 2/11/23~~
5	0%	Gateway 4: Approval to issue pricing documentation to market	Fri 1/11/24	Fri 1/11/24
6	0%	Gateway 5: Contract Award	Thu 8/05/25	Thu 8/05/25
7	0%	Gateway 6: Construction Complete	Wed 31/12/25	Wed 31/12/25
8	0%	Gateway 7: Project Closeout	Mon 13/03/28	Mon 13/03/28
9	15%	**Delivery Programme**	Wed 27/01/21	Fri 29/06/29
10	100%	**Phase 1: Define**	Wed 27/01/21	Wed 10/02/21
12	100%	**Phase 2: Plan**	Mon 1/03/21	Fri 29/10/21
14	88%	**Phase 3: Concept Design**	Mon 1/11/21	Wed 18/10/23
31	31%	**Combined Ph3-5 Costs**	Tue 1/11/22	Mon 30/06/25
67	15%	**Phase 4: Detailed Design**	Thu 1/09/22	Thu 13/03/25
68	100%	**Prelim Design - Historic**	Thu 1/09/22	Mon 31/10/22
69	100%	**22/23 FY historic costs**	Thu 1/09/22	Mon 31/10/22
72	100%	Update Civil3D base model and drawings	Wed 26/10/22	Tue 15/11/22
73	30%	Investigation Works	Thu 26/01/23	Fri 17/11/23
74	12%	**Stage 1**	Mon 16/01/23	Thu 17/10/24
75	30%	Preliminary Design	Mon 16/01/23	Fri 22/12/23
76	0%	Consenting	Wed 3/01/24	Thu 17/10/24
77	0%	Detailed Design	Wed 3/01/24	Wed 26/06/24
78	0%	Prepare procurement documents and Legal review, including preparation of Gateway 4 checklist	Wed 1/05/24	Wed 12/06/24
79	0%	Gateway 4 for Stage 1	Thu 17/10/24	Thu 17/10/24
80	0%	**Stage 2**	Mon 30/10/23	Thu 13/03/25
81	0%	Preliminary Design	Mon 30/10/23	Wed 31/01/24
82	0%	Consenting	Tue 2/04/24	Thu 16/01/25
83	0%	Detailed Design	Thu 27/06/24	Fri 13/12/24
84	0%	Prepare procurement documents and Legal review , including preparation of Gateway 4 checklist	Fri 17/01/25	Mon 3/03/25
85	0%	Gateway 4 for Stage 2	Thu 13/03/25	Thu 13/03/25
86	0%	**Phase 5: Procure**	Mon 4/11/24	Wed 27/08/25
87	0%	**Stage 1**	Mon 4/11/24	Wed 23/04/25
90	0%	**Stage 2**	Tue 18/03/25	Wed 27/08/25
93	0%	**Phase 6: Construct**	Thu 24/04/25	Fri 29/06/29
94	0%	Physical Works	Fri 23/05/25	Tue 21/12/27
95	0%	**Stage 1**	Thu 24/04/25	Wed 31/12/25
99	0%	**Stage 2**	Thu 28/08/25	Fri 29/06/29
103	0%	**PW Costs**	Fri 23/05/25	Fri 29/06/29
112	0%	**MSQA**	Thu 28/08/25	Fri 29/06/29
113	0%	MSQA Stage 1	Fri 12/09/25	Tue 30/06/26
114	0%	MSQA Stage 2	Thu 28/08/25	Fri 29/06/29



* Noting uncertainty in consenting timeframes.

* This will be refined once detail design is complete for each stage.

* The programme has been based on a phased approval of funding.