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Technical memorandum

TO	Andrea Richardson	FROM	Nic Love
	Environment Canterbury	DATE	10 December 2018
RE	Hinds/Hekeao Resource Consent Inventory Summary		

1.0 Introduction

This memorandum has been prepared by Pattle Delamore Partners (PDP) to provide details on the process that was applied to create the surface water and stream depleting groundwater resource consent inventory (RCI) prepared by PDP for the Hinds/Hekeao Plains, which includes the Hinds River and a series of lowland drains. The consents that were considered for the RCI were all surface water takes, surface water diversions, stream depleting groundwater takes and non stream depleting groundwater consents. This memorandum provides a brief description of the review process, details of the most commonly found issues and limitations relating to the content of the inventory.

Information from the RCI has subsequently been used for the associated technical assessments in the PDP report titled *'Technical Work for the Hinds/Hekeao Plains Area'*.

This memorandum should be read in conjunction with the initial memorandum *'Hinds/Hekeao Plains Resource Consent Inventory'* prepared by PDP (3 September 2018), which sets out the agreed methodology and assumptions prior to undertaking the RCI.

2.0 Planning Requirements

2.1 Canterbury Land and Water Regional Plan

The Hinds/Hekeao Plains area falls under the provisions of the Canterbury Land and Water Regional Plan (LWRP), specifically section 13 which covers the wider Ashburton Zone. As such, stream depletion calculations have been undertaken in accordance with Schedule 9 of the LWRP as detailed in the initial memorandum provided to ECan on 3 September 2018.

3.0 Methodology Used to Prepare the Resource Consent Inventory

The memorandum provided to ECan on 3 September 2018 detailed the proposed methodology and this was agreed upon and signed off by ECan.

In addition to the initial methodology, the following methods were also incorporated during the RCI compiling process:

- Transmissivity and storativity values were provided to PDP by ECan for each bore meeting the stream depletion depth cut-off criteria. These parameters were not separated into specific aquifer test results, estimated transmissivities using the Bal T method or default assumed values of transmissivity for the RCI.

- For the purposes of the RCI, the drain alignments were based on the longest line of the overview maps (pages 55 to 57 of the Hinds Drains Working Party (HDWP) recommendations), the primary drain (black line, frame 2 of the detailed maps within the HDWP recommendations) and the main drains (orange line, frame 1 from the detailed maps within the HDWP recommendations). For most of the drains this means that the alignment shown in the overview maps were used. A high level check using the latest aerial imagery available from the Land Information New Zealand (LINZ) Data Service was used when determining the alignment of the drains, and minor modifications were made to Parakanoi, Deals and Moffats Drain and agreed upon by ECan. Additionally, the alignment of the drains near the intersections of Taylors Drain, Windermere Cutoff and McLeans Swamp Road Drain were modified upon discussion with ECan and it was decided that Windermere Cutoff would not be included in the RCI due to McLeans Swamp Road Drain being diverted into Taylors Drain, except in flood events where the excess water enters the Hinds River via the Windermere Cutoff.
- The alignment of Moffats Drain was delineated by ECan staff and a member of the HDWP and provided to PDP on 2 November 2018. This map was used to digitise the alignment of Moffats Drain for the purposes of the RCI.
- It was agreed upon between ECan and PDP that Wheatstone Drain would not be included in the RCI as this drain flows into the Ashburton River. However, this drain alignment was still used for the RCI to determine which stream depleting groundwater consents are stream depleting on this waterway, and should subsequently be excluded from the RCI.
- In addition to the above point, all deep groundwater consents within 2 km of the waterways (including Wheatstone Drain) and within the boundaries of the Rangitata and Ashburton Rivers (and coastal strip) were included in the RCI to aid with the technical work undertaken for the Hinds/Hekeao Area.
- Three groundwater take consents that are stream depleting on the Rangitata River (CRC000301, CRC962057.1 and CRC142723) have been included in the RCI as these are within the defined coastal strip area.
- There are two diversion consents (CRC962603.1 and CRC962606.1) which authorise the Eiffelton Community Group Irrigation Scheme (ECGIS) to divert 100 L/s from Deals Drain to Windermere Drain and to divert a further 150 L/s from Windermere Drain to Home Paddock Drain. Given that these diversions allow water to be taken away from their respective drain and not returned to the same drain we have included both these consents in the allocation.
- The allocation for the Hinds River has been split into the Hinds River (Main Stem) and Hinds River South Branch. Upon discussion with ECan, it was decided that consents from tributaries of the Hinds River South Branch (such as Limestone Creek) would be included in the Hinds River South Branch allocation. Only consents from the Hinds River (Main Stem) have been included in the allocation, as tributaries of the Hinds River (Main Stem) have been counted under their own allocation summary (i.e. northern Drain, Taylors Drain etc.).

4.0 Key Findings

Some key findings of the RCI compiling process were related to the following:

- Some shallow groundwater takes had minimum flow conditions for waterways that are not the closest waterway based on the approved methodology for determining the waterway alignments. This has been noted in the comments section for these consents, and the closest drain based on the approved waterway alignments was used for allocation purposes.

- PDP noted a number of surface water abstraction consents with minimum flows on drains not listed in Table 13(e) of the LWRP. Specifically, those drains listed as Unnamed Drain (CRC012612), Morrows Drain (CRC952083.3) and Private Drain (CRC054880.3). Consents with minimum flows for these drains were allocated to Deals Drain, Boundary Drain and Harris Drain respectively as per the notes contained in Table 9.4 of the ECan report titled *'Water resources of the Hinds/Hekeao catchment: modelling scenarios for load setting planning process'*. These consents have also been identified in the comments section of the RCI.
- A surface water consent to take water from McKeages Drain (CRC160167) has been allocated to Stormy Drain and surface water consents CRC000341 and CRC157124 have had the McLeans Swamp Road Drain surface water takes allocated to Taylors Drain as per the notes in table 9.4 of the ECan report titled *'Water resources of the Hinds/Hekeao catchment: modelling scenarios for load setting planning process'*. Surface water take consent CRC169502 authorises Ashburton District Council to abstract water from a number of abstraction locations within the district. To be consistent with the above method we have allocated the McLeans Swamp Road Drain component of this consent to Taylors Drain.
- It should be noted that the stream depleting groundwater consents for the Hinds River (Main Stem) and Hinds River South Branch are included in the 'Stream depleting' tab and not the 'Groundwater tab' as only the surface water components of these consents are included in the RCI. Deep groundwater takes are not included in the Hinds River portion of the RCI. Hence, column 'L' (In GW allocation) of the 'Stream depleting' tab for these consents is listed as 'N/A'.
- Accela has an option to log whether a consent has complex consent conditions. This is generally for the purposes of logging consents that are not straightforward, and could have linked rates or volumes to multiple consents or be non-concurrent (consent cannot be exercised when another consent is being exercised) with other consents. Generally, these consents need to be looked at in more detail when calculating allocation summaries for a particular area. However, there were a number of consents that had neither option ticked for the 'complex allocation' option in the Accela database. These have been added in red in the RCI.
- Some consents had been incorrectly counted or not counted in the allocation on the Accela Database. These consents have been highlighted in red with an explanation around the allocation reasoning.
- There were a number of consents that had a return period volume listed in the consent conditions but this had not been correctly logged on the Accela Database. These errors have been highlighted and the correct periods are listed in the RCI spreadsheet.

5.0 Limitations of the Consent Inventory Process

It should be noted that the following limitations have been identified when creating the resource consent inventory:

- PDP have relied on the aquifer parameters provided by ECan to be correct and have not undertaken any further investigation into these numbers.
- PDP have calculated the stream depletion effects based on the nearest waterway as per the approved methodology. Consents with more than one minimum flow site or minimum flow sites on a different waterway have not been taken into account for determining the allocation numbers for each waterway.
- PDP have relied on the bore/WAP coordinates in the Wells database being correct, and have not looked into records to confirm the locations of any bores/WAPs.

- PDP have relied on the drain alignments provided in the associated HDWP recommendations to define the drain alignments used in the RCI. Some minor modifications were made as a result of a high level check on the drain alignments but PDP have not undertaken any fieldwork to confirm the drain alignments.
- PDP have adhered to the RCI methodology of including all surface water and groundwater consents within 2 km of the designated waterways (excluding Wheatstone Drain as explained above). Some consents contain multiple points of take (either bores or surface water abstraction points) and only the points of take that are within the 2 km buffer have been included in the RCI.
- ECan provided PDP with a map showing the full alignment of Moffats Drain which PDP subsequently used to digitise the alignment of this drain. Some minor modifications/refinements were made using historical aerial imagery from google earth.
- It should be noted that not all of the drains provided in the RCI are permanently flowing. As such, the desktop stream depletion estimates made for these drains may not actually occur in reality depending on local groundwater levels and surface water flow conditions. However, connected groundwater takes will influence the extent and duration of the dry sections.

6.0 Consent Duration Information for Each of the Hinds Drains Listed in Table 13(e) of the LWRP

Graphs of consent duration information for each of the Hinds Drains listed in Table 13(e) of the LWRP, separated into the surface water and stream depleting groundwater components for each waterway are attached to this memorandum. The raw data spreadsheet for these graphs has also been provided in a separate file. The following date ranges for presenting the allocation totals have been used:

- 2019 to 2025;
- 2026 to 2030;
- 2031 to 2035;
- 2036 to 2040; and
- 2041 to 2045.

A number of waterways do not have any stream depleting or surface water allocation components, or the entire surface water or stream depleting groundwater component is included within one of the date ranges above. These have been described below rather than presenting in graphical form.

6.1 Surface Water Components

The following section outlines the consent information for waterways with consents that have a surface water take component within only one date range provided in Section 6.0.

- Blees Drain – 85 L/s is due to expire between 2026 and 2030.
- Windermere Drain – 565 L/s is due to expire between 2031 and 2035.
- Stormy Drain – 169.5 L/s is due to expire between 2026 and 2030.
- Dawsons Drain – 35 L/s is due to expire between 2031 and 2035.
- Home Paddock Drain – 243 L/s is due to expire between 2031 and 2035.
- Griggs Drain – 100 L/s is due to expire between 2026-2030.
- Yeatmans Drain – 38 L/s is due to expire between 2036 and 2040.

- Oakdale Drain – 58 L/s is due to expire between 2036 and 2040.
- Montgomerys Drain – 80 L/s is due to expire between 2026 and 2030.
- Pyes Drain – 241 L/s is due to expire 2026 and 2030.

The consent duration information for the remaining waterways with surface water consents allocated over more than one date range are presented in Attachment 1.

6.2 Stream Depleting Components

The following section outlines the consent information for waterways with consents that have a take component within only one date range provided in Section 6.0.

- Windermere Drain – 6.2 L/s is due to expire between 2026 and 2030.
- Stormy Drain – 82 L/s is due to expire between 2031 and 2035.
- Spicers Drain – 6.1 L/s is due to expire between 2026 and 2030.
- Taylors Drain – 15 L/s is due to expire between 2031 and 2035.
- Yeatmans Drain – 39.8 L/s is due to expire between 2031 and 2035.
- Pyes Drain – 14.5 L/s is due to expire between 2026 and 2030.

The consent duration information for the remaining waterways with stream depleting consents allocated over more than one date range are presented in Attachment 2.

7.0 Conclusions

Based on the methodology applied for the RCI, a total of 1,409.2 L/s stream depleting groundwater and 5,688.6 L/s of surface water has been allocated to the Hinds Drains. Likewise, a total of 341.2 L/s of stream depleting groundwater and 846.6 L/s of surface water has been allocated to the Hinds River (Main Stem) and Hinds River South Branch. These numbers have been obtained using the methodology outlined in this memorandum in conjunction with the initial memorandum provided to ECan by PDP on 3 September 2018.

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Limitations

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Environment Canterbury. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the memorandum. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This memorandum has been prepared by PDP on the specific instructions of Environment Canterbury for the limited purposes described in the memorandum. PDP accepts no liability if the memorandum is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Attachment 1: Surface Water Consent Duration Information

The following charts provide details on the amount of water allocated to each waterway for specific time periods (consents that are included in the allocation), along with charts of the number of consents within each date range (regardless of whether the consent is included in the allocation or not).

Flemington Drain:

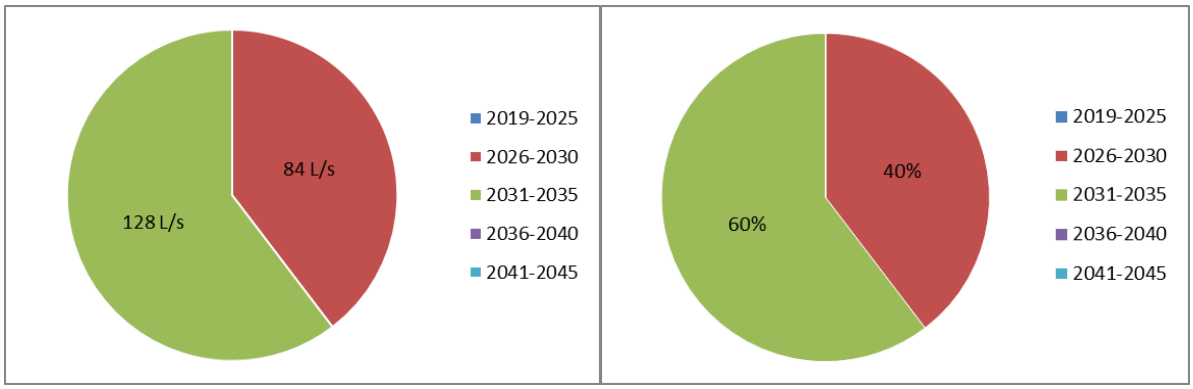

Figure 1: Rate (l/s) and percentage allocation for surface water takes from Flemington Drain

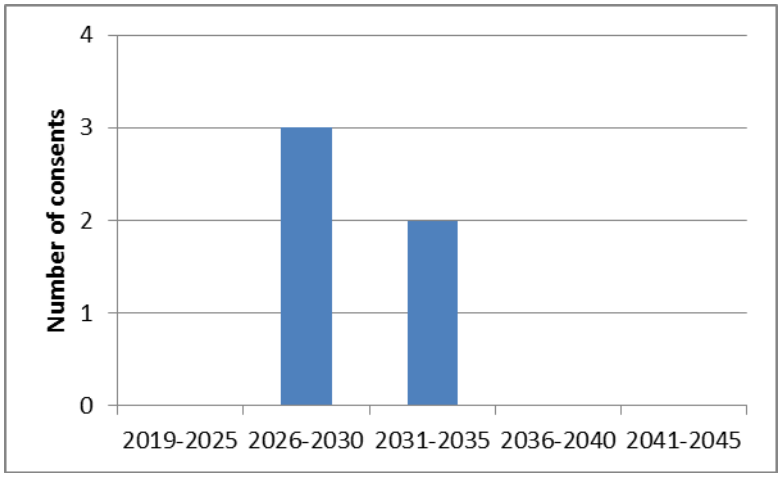

Figure 2: Number of surface water consents from Flemington Drain by expiry date

Parakanoi Drain:

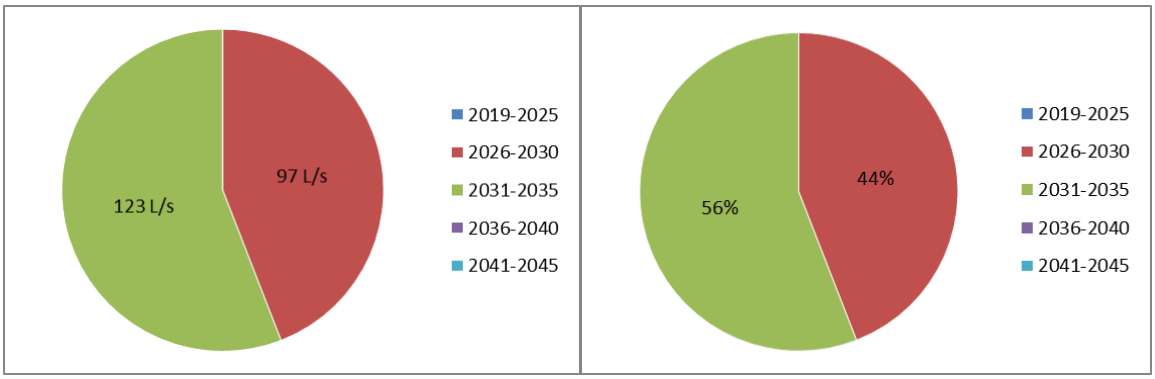

Figure 3: Rate (l/s) and percentage allocation for surface water takes from Parakanoi Drain

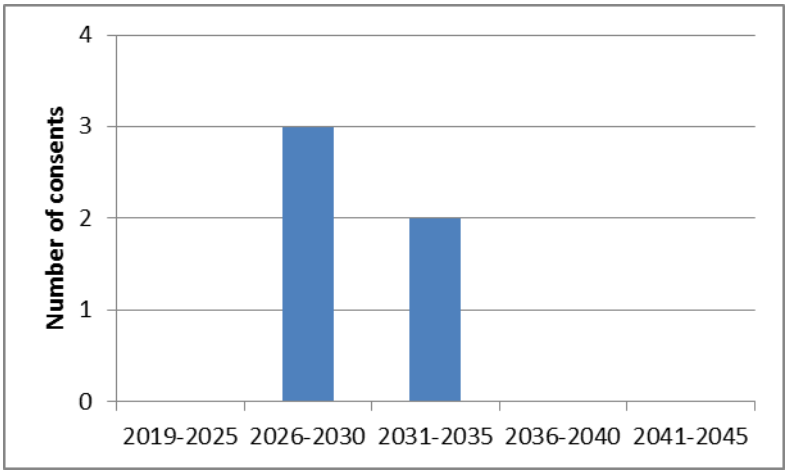

Figure 4: Number of surface water consents from Parakanoi Drain by expiry date

Boundary Drain:

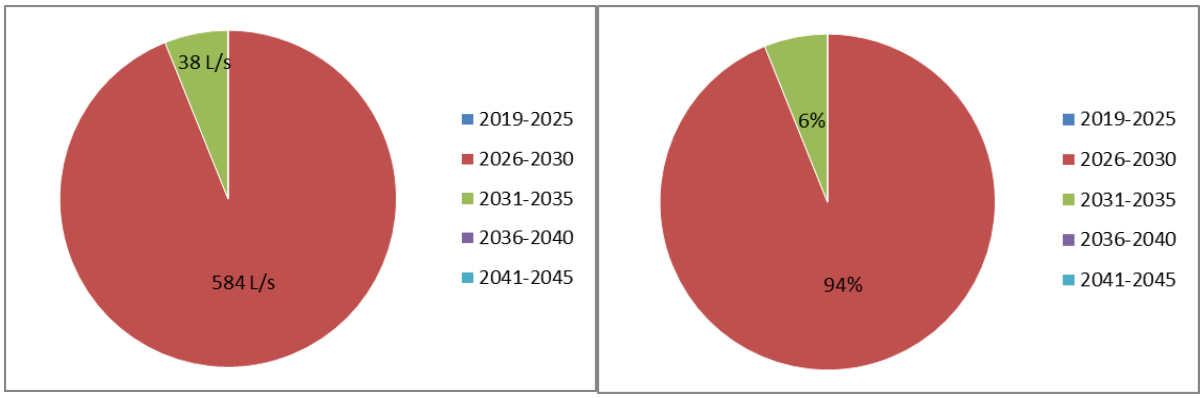

Figure 5: Rate (l/s) and percentage allocation for surface water takes from Boundary Drain

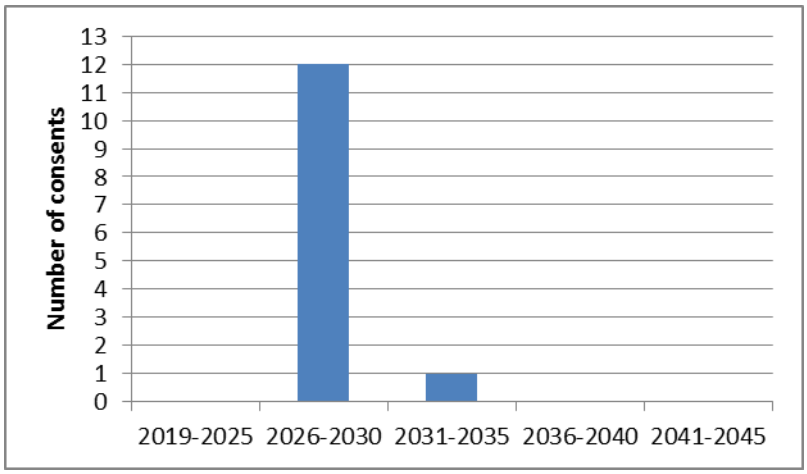

Figure 6: Number of surface water consents from Boundary Drain by expiry date

Spicers Drain:

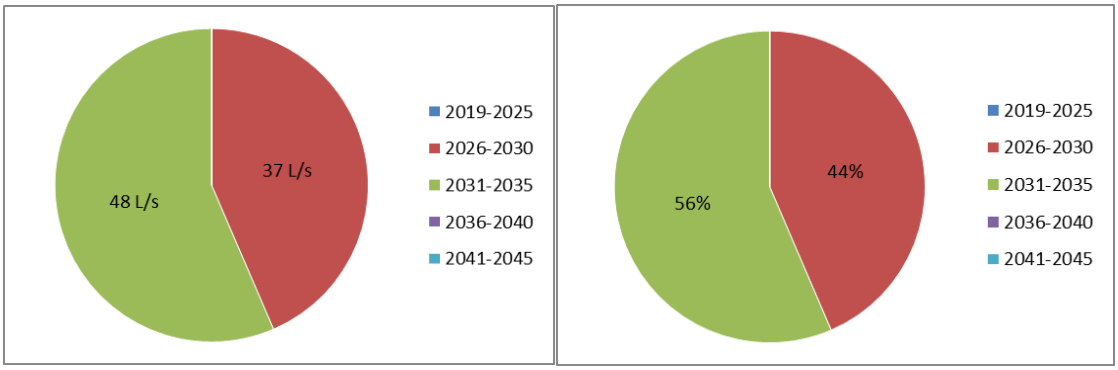

Figure 7: Rate (l/s) and percentage allocation for surface water takes from Spicers Drain

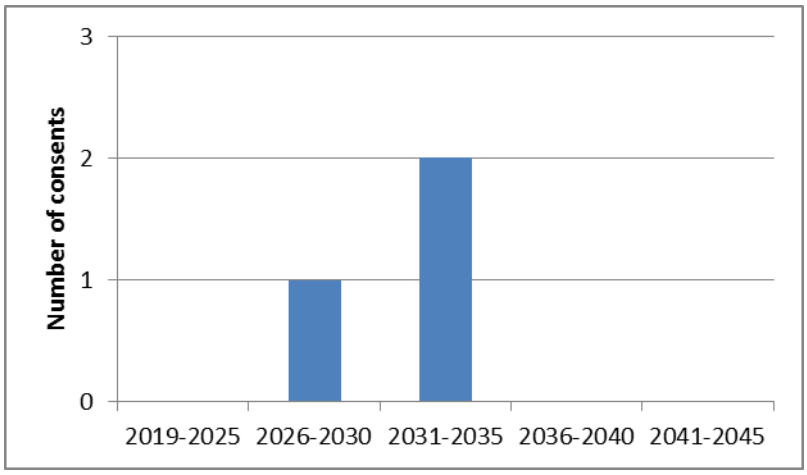

Figure 8: Number of surface water consents from Spicers Drain by date

Deals Drain:

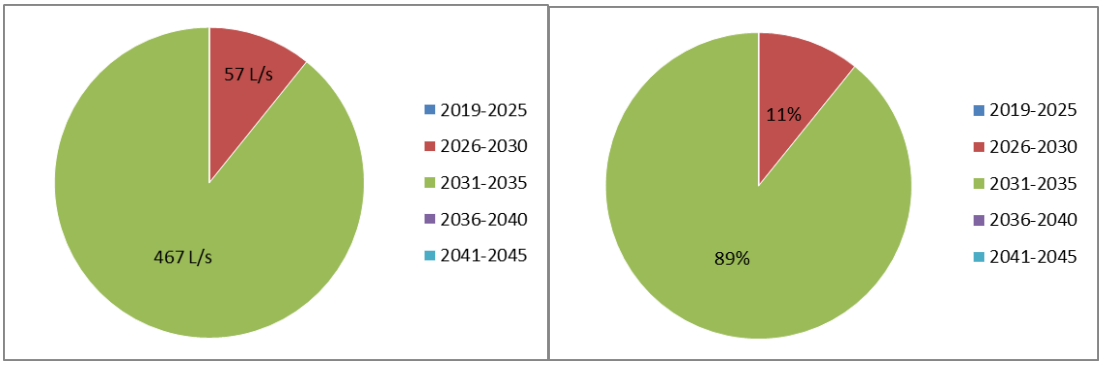

Figure 9: Rate (l/s) and percentage allocation for surface water takes from Deals Drain

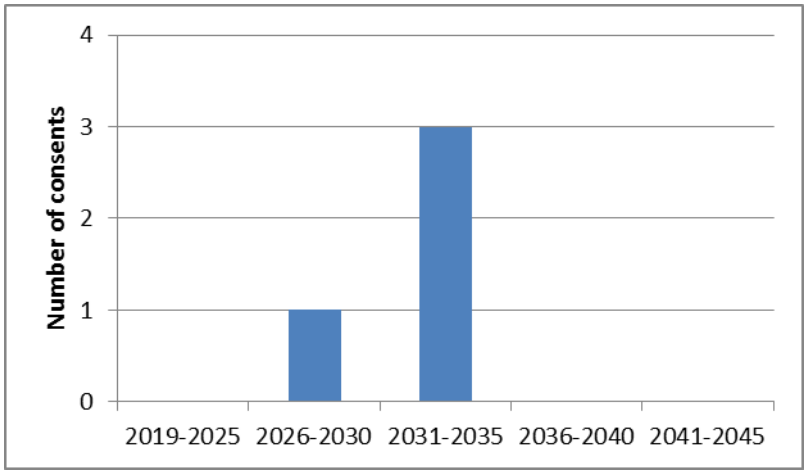

Figure 10: Number of surface water consents from Deals Drain by date

O'Shaughnessys Drain:

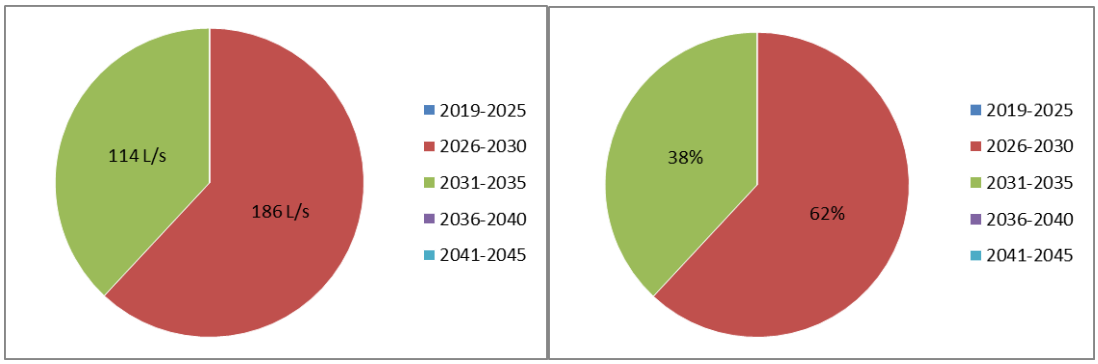

Figure 11: Rate (l/s) and percentage allocation for surface water takes from O'Shaughnessys Drain

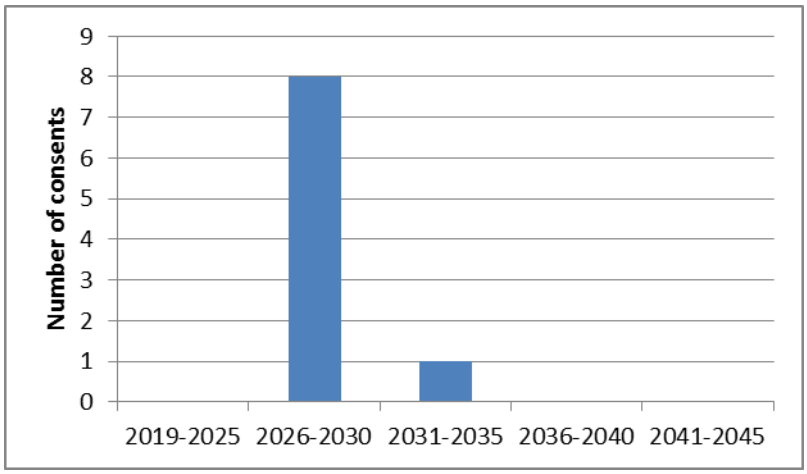

Figure 12: Number of surface water consents from O'Shaughnessys Drain by date

Northern Drain:

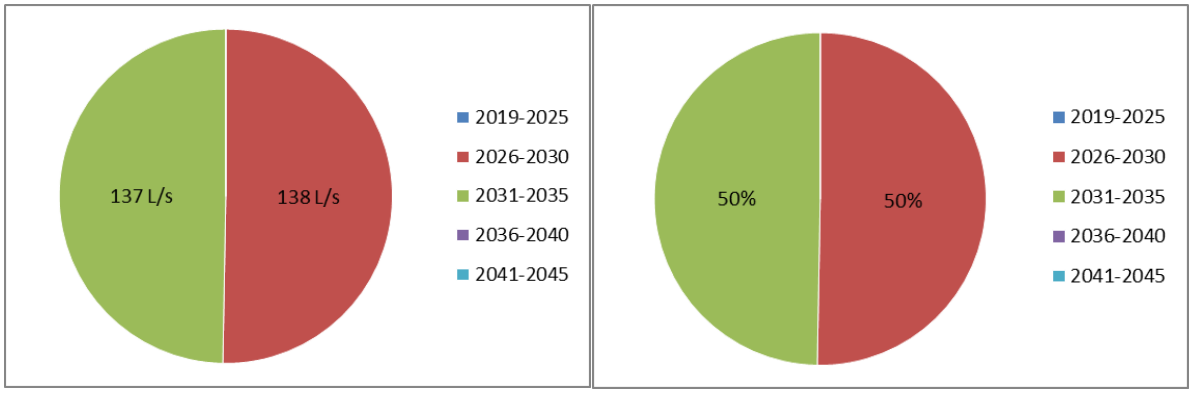

Figure 13: Rate (l/s) and percentage allocation for surface water takes from Northern Drain

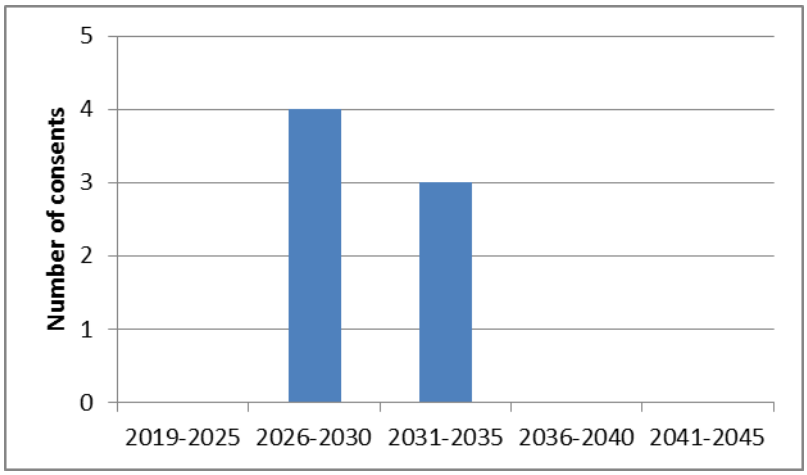

Figure 14: Number of surface water consents from Northern Drain by date

Dobsons Drain:

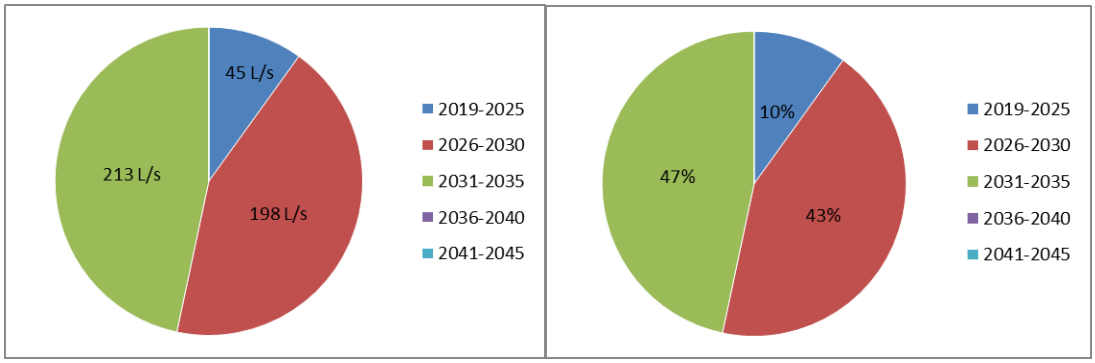

Figure 15: Rate (l/s) and percentage allocation for surface water takes from Dobsons Drain

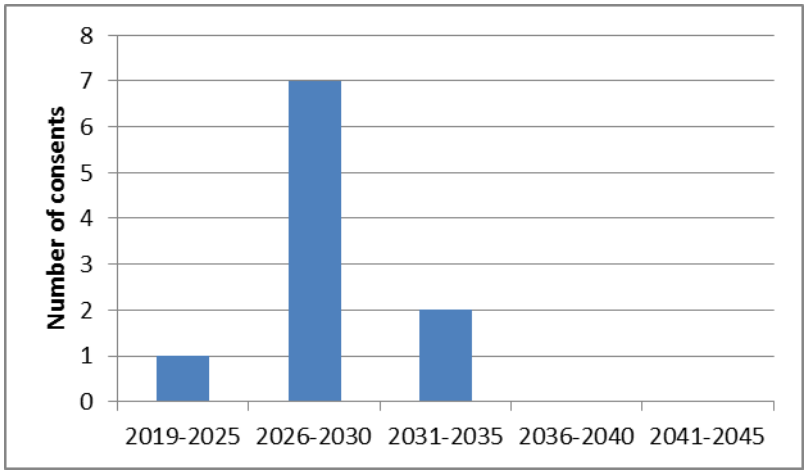

Figure 16: Number of surface water consents from Dobsons Drain by date

Twenty One Drain:

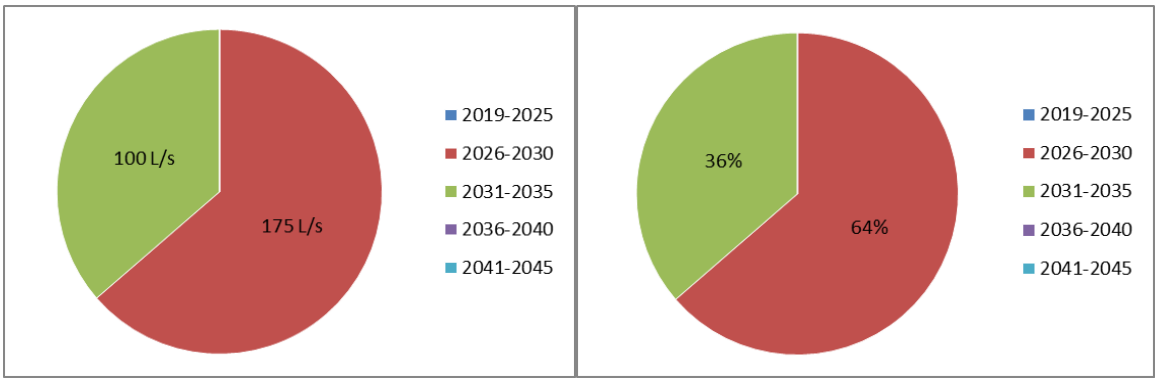

Figure 17: Rate (l/s) and percentage allocation for surface water takes from Twenty One Drain

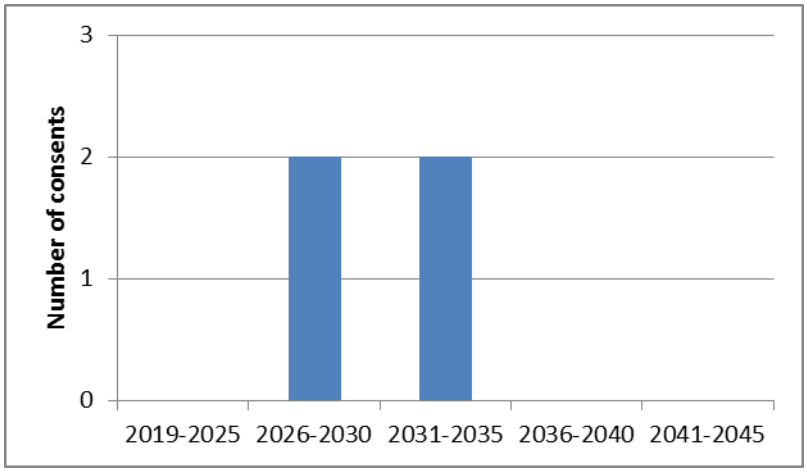

Figure 18: Number of surface water consents from Twenty One Drain by date

Crows Drain:

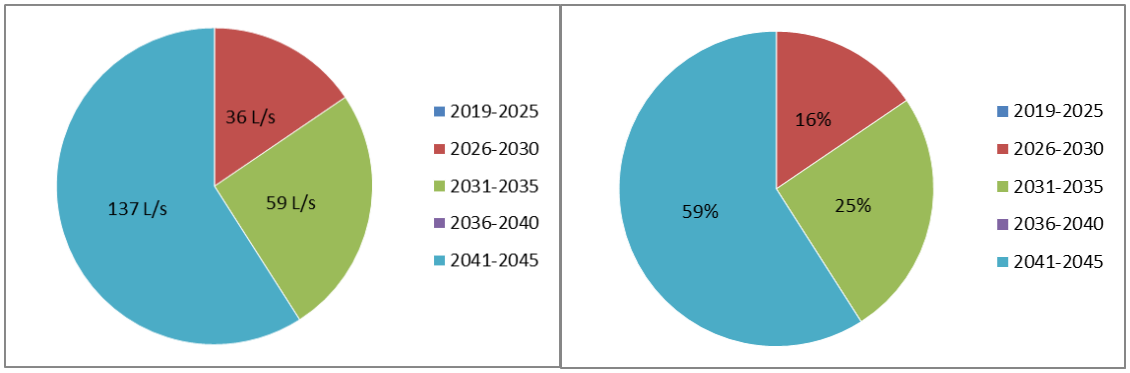

Figure 19: Rate (l/s) and percentage allocation for surface water takes from Crows Drain

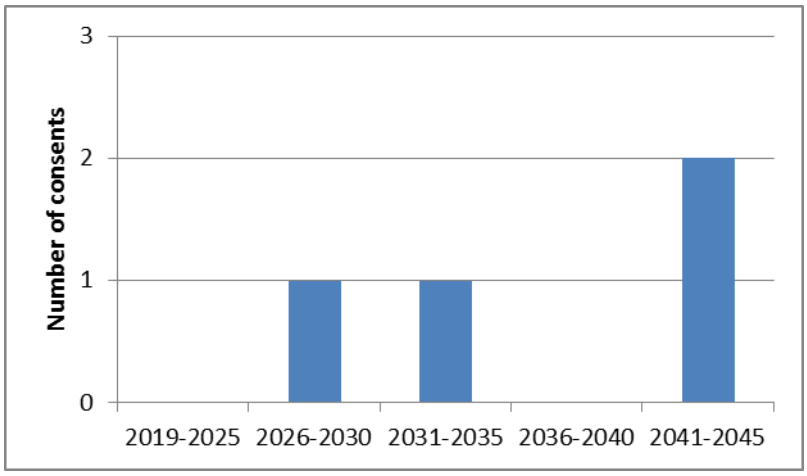

Figure 20: Number of surface water consents from Crows Drain by date

Harris Drain:

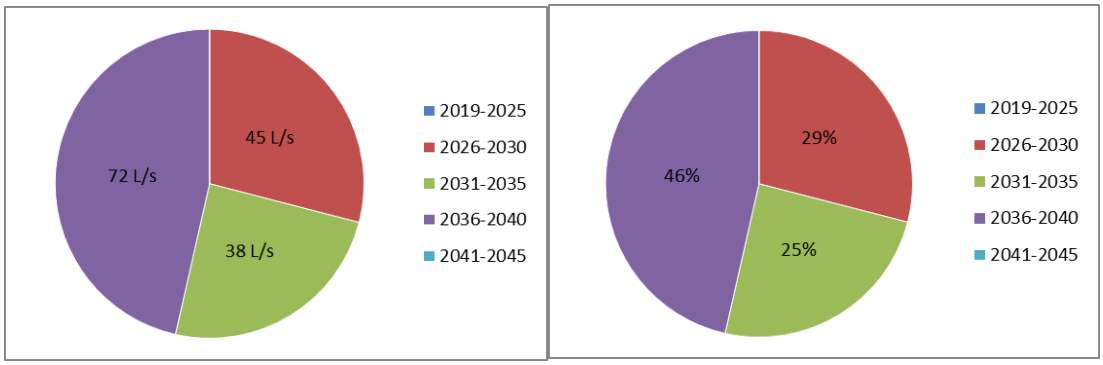

Figure 21: Rate (l/s) and percentage allocation for surface water takes from Harris Drain

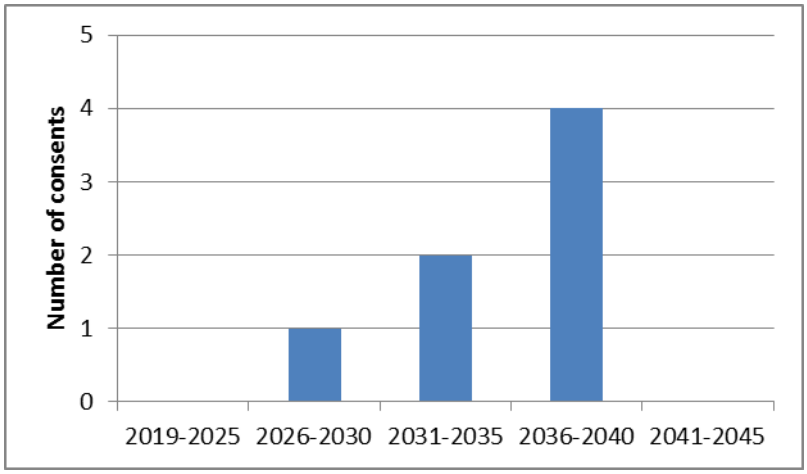

Figure 22: Number of surface water consents from Harris Drain by date

Taylors Drain:

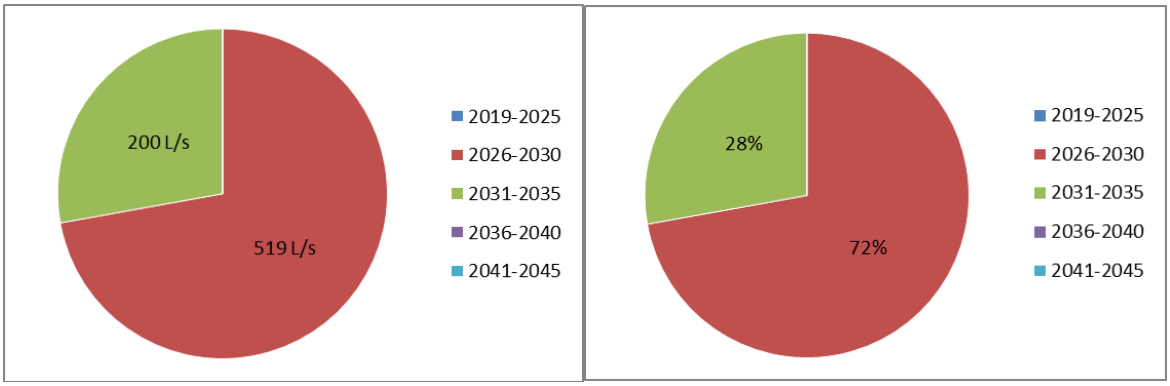

Figure 23: Rate (l/s) and percentage allocation for surface water takes from Taylors Drain

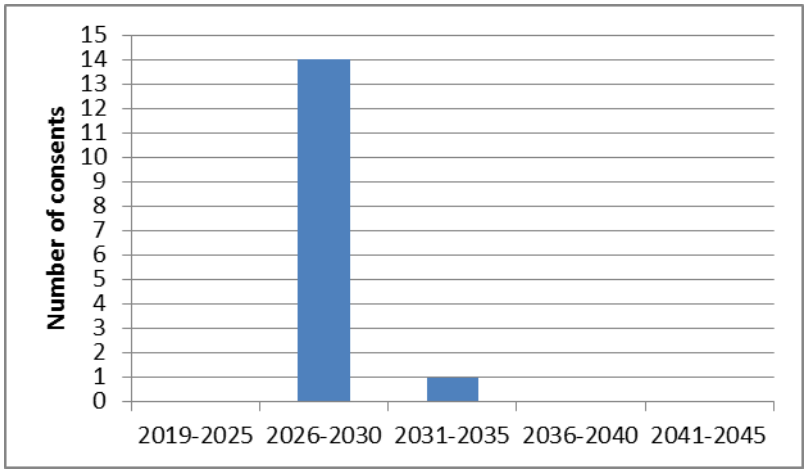

Figure 24: Number of surface water consents from Taylors Drain by date

Attachment 2: Stream Depleting Consent Duration Information

The following charts provide details on the amount of water allocated to each waterway for specific time periods (consents that are included in the allocation), along with charts of the number of consents within each date range (regardless of whether the consent is included in the allocation or not).

Blees Drain:

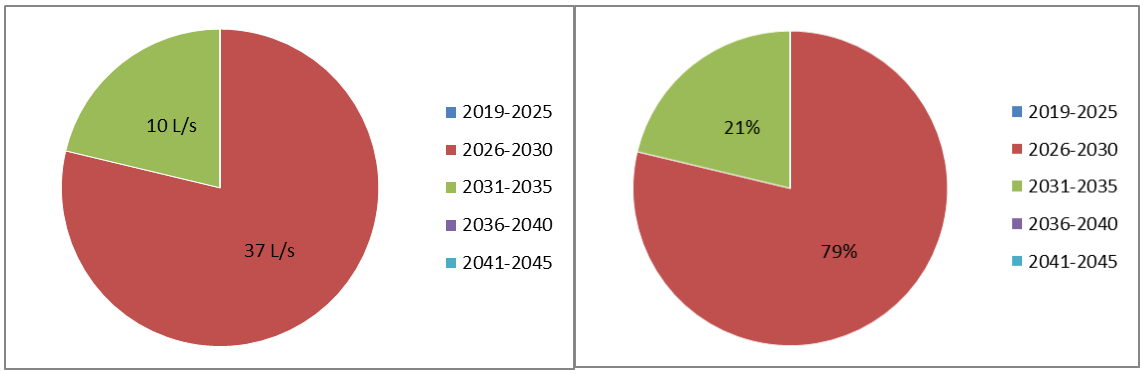

Figure 25: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Blees Drain

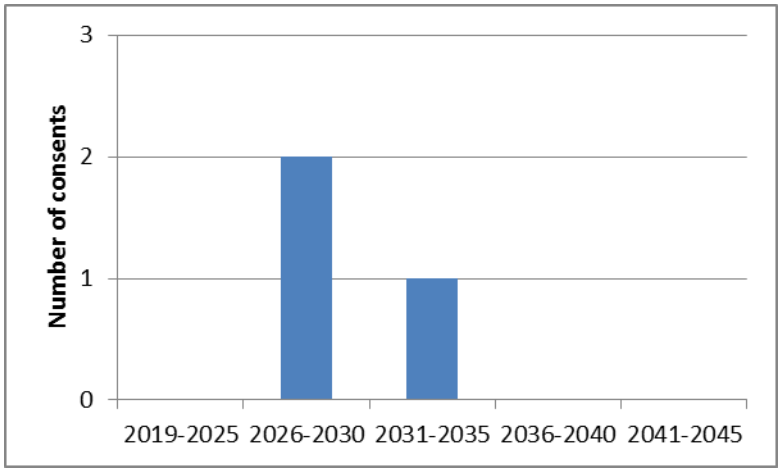

Figure 26: Number of stream depleting groundwater consents from Blees Drain by date

Flemington Drain:

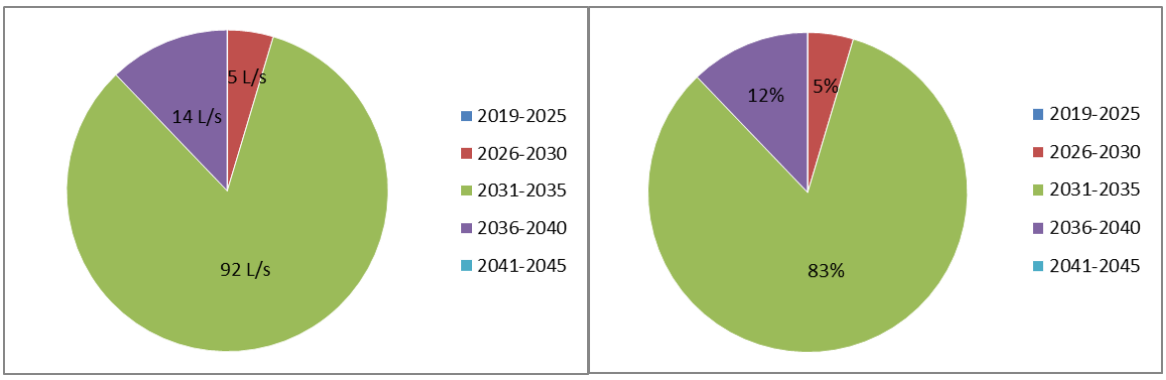

Figure 27: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Flemington Drain

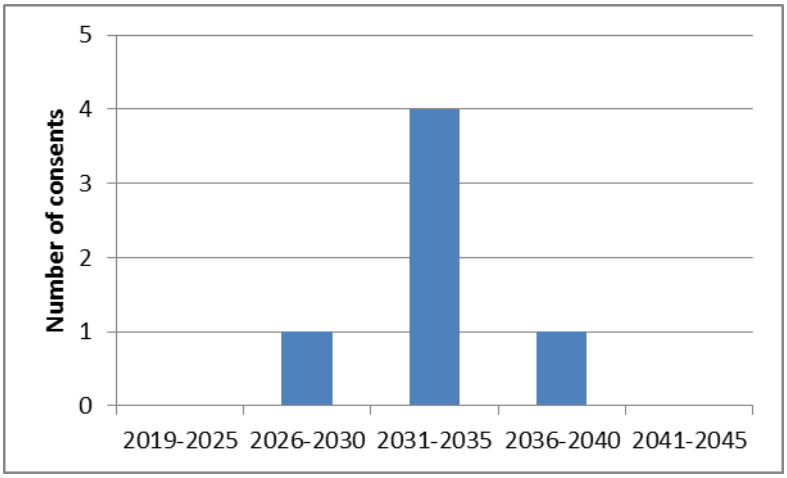

Figure 28: Number of stream depleting groundwater consents from Flemington Drain by date

Parakanoi Drain:

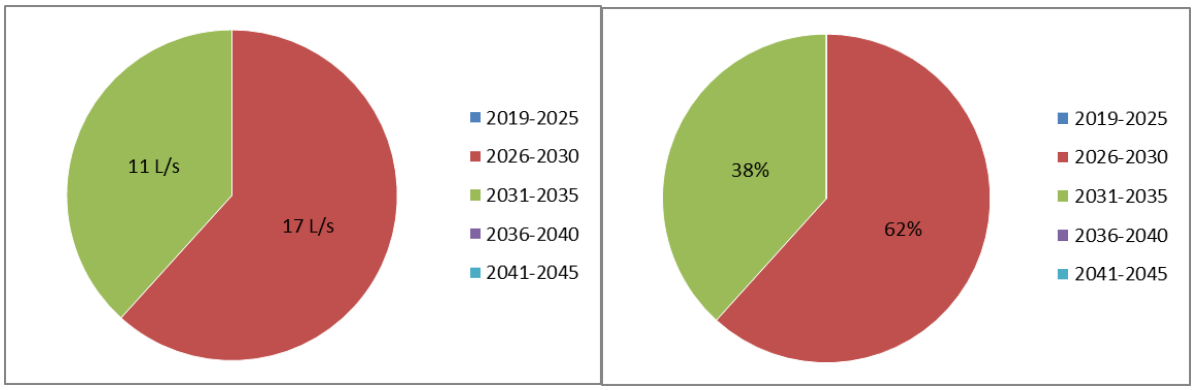

Figure 29: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Parakanoi Drain

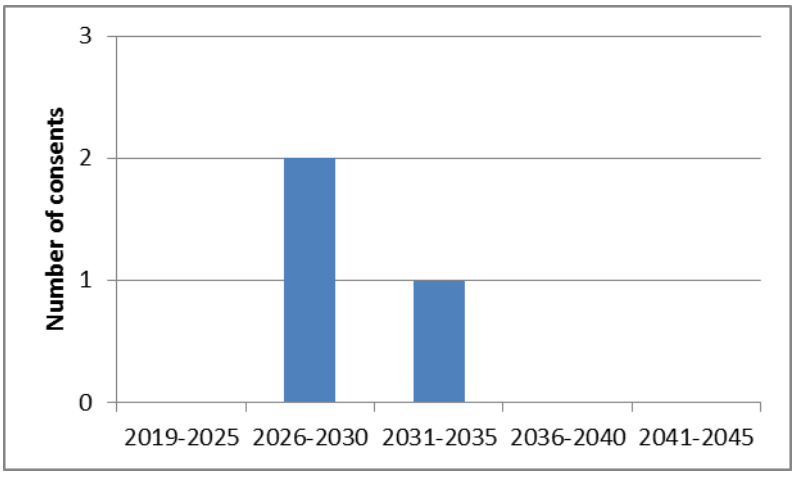

Figure 30: Number of stream depleting groundwater consents from Parakanoi Drain by date

Boundary Drain:

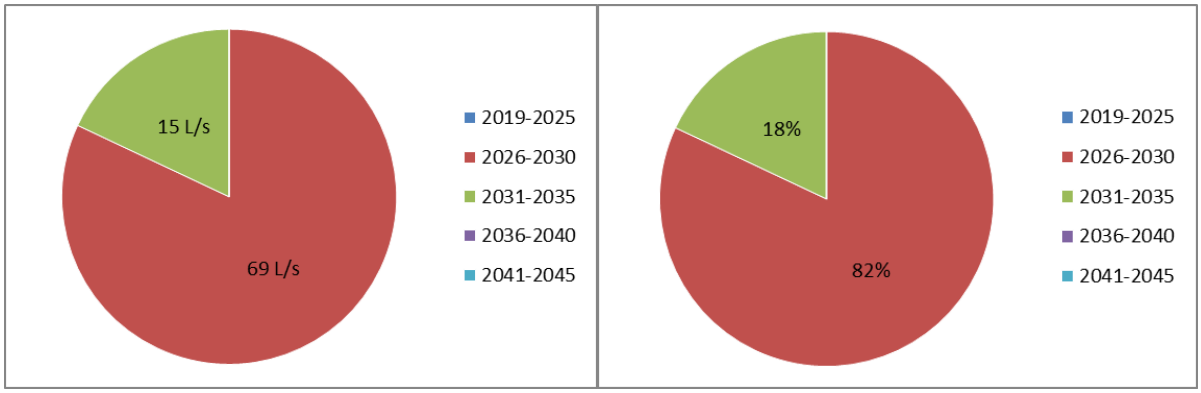

Figure 31: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Boundary Drain

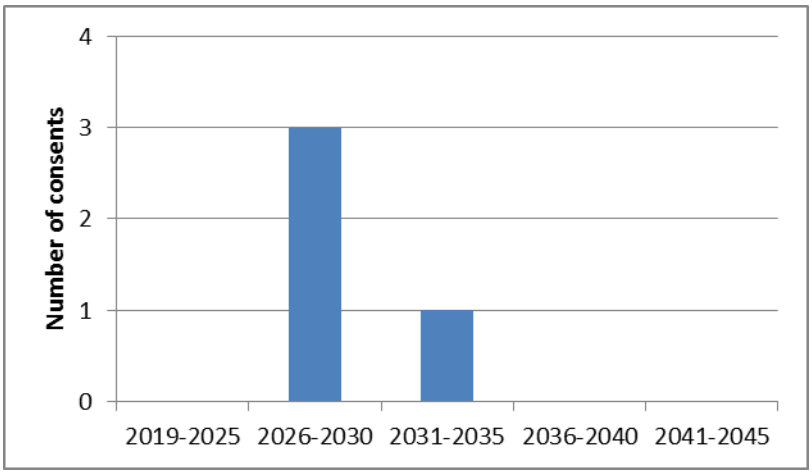

Figure 32: Number of stream depleting groundwater consents from Boundary Drain by date

Home Paddock Drain:

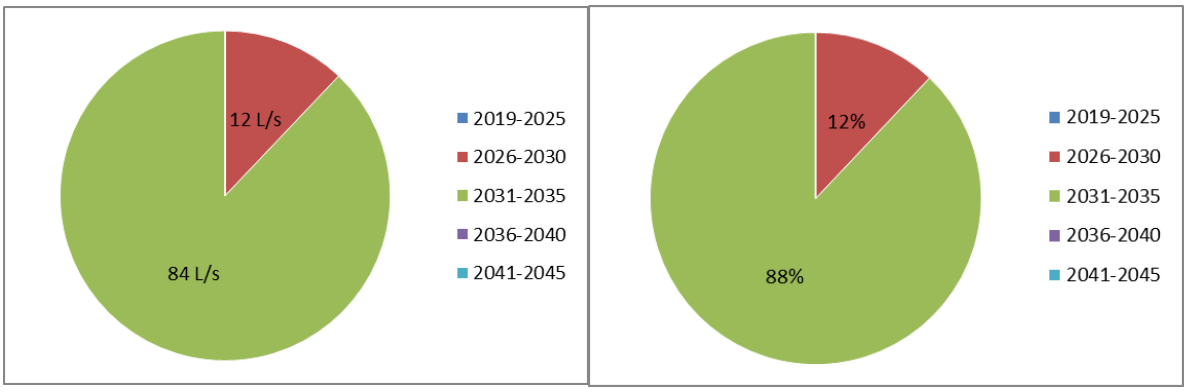

Figure 33: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Home Paddock Drain

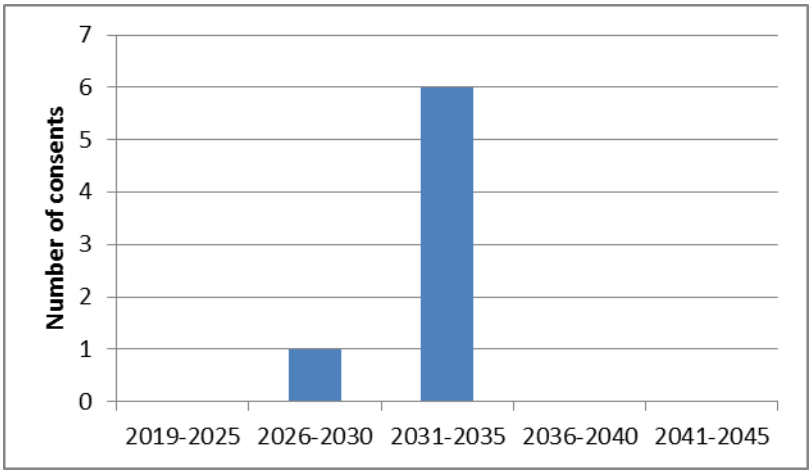

Figure 34: Number of stream depleting groundwater consents from Home Paddock Drain by date

O'Shaughnessys Drain:

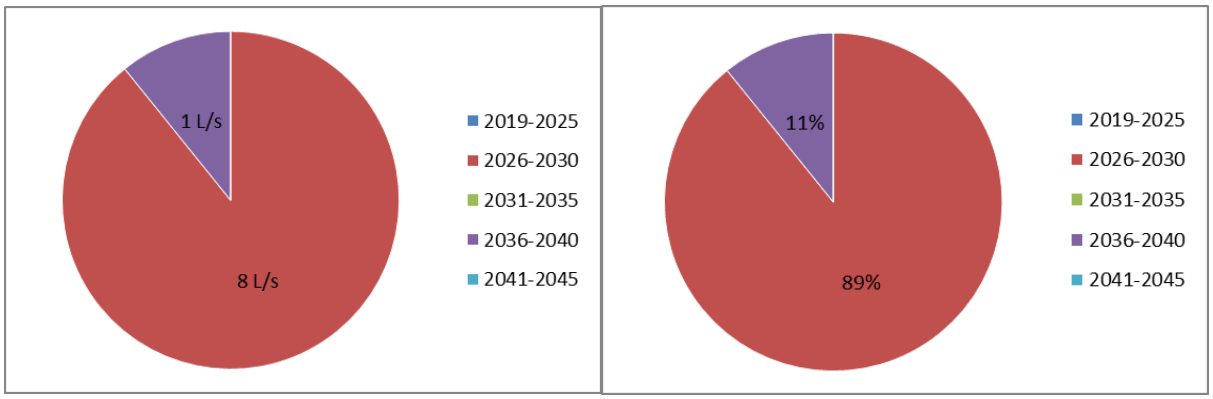

Figure 35: Rate (l/s) and percentage allocation for stream depleting groundwater takes from O'Shaughnessys Drain

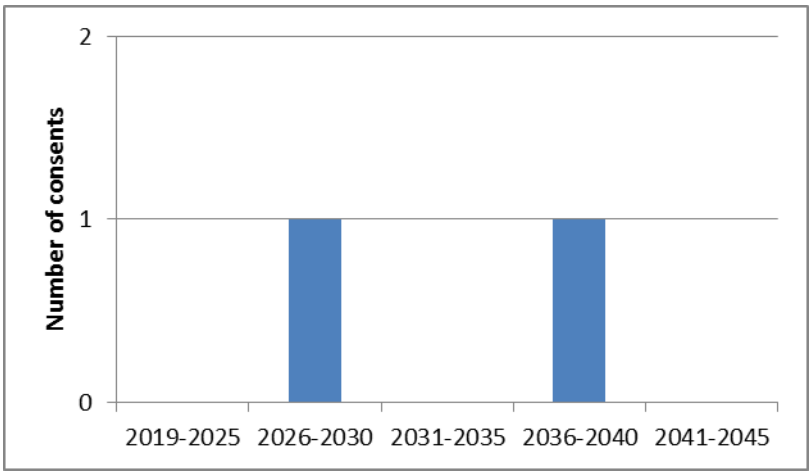

Figure 36: Number of stream depleting groundwater consents from O'Shaughnessys Drain by date

Northern Drain:

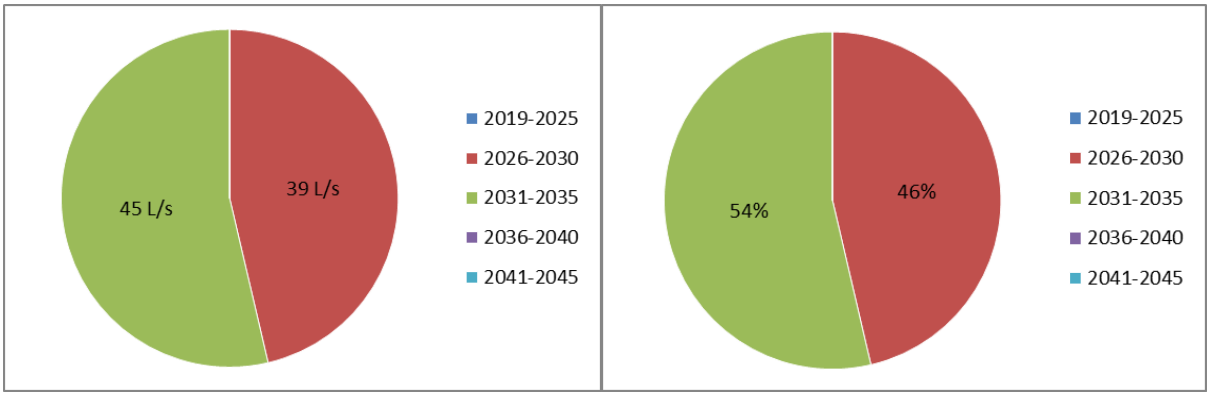

Figure 37: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Northern Drain

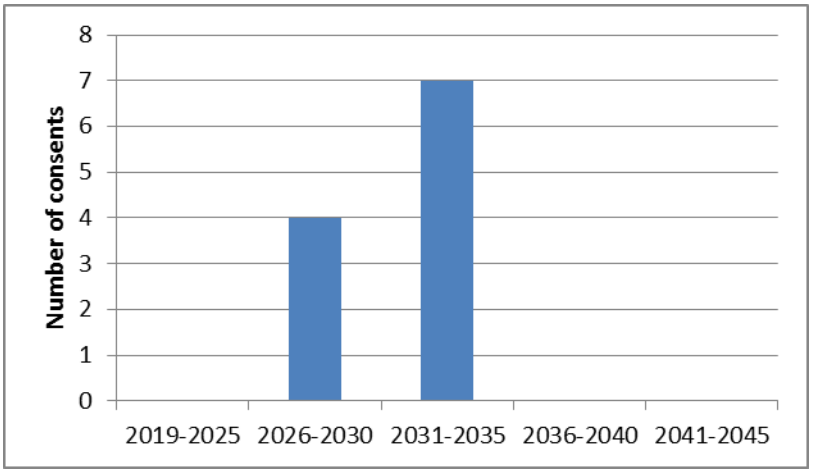

Figure 38: Number of stream depleting groundwater consents from Northern Drain by date

Dobsons Drain:

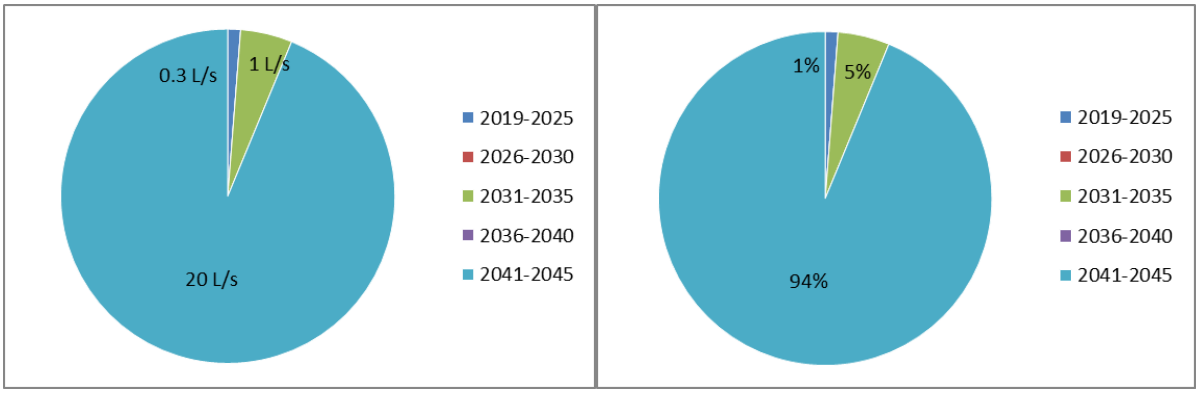

Figure 39: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Dobsons Drain

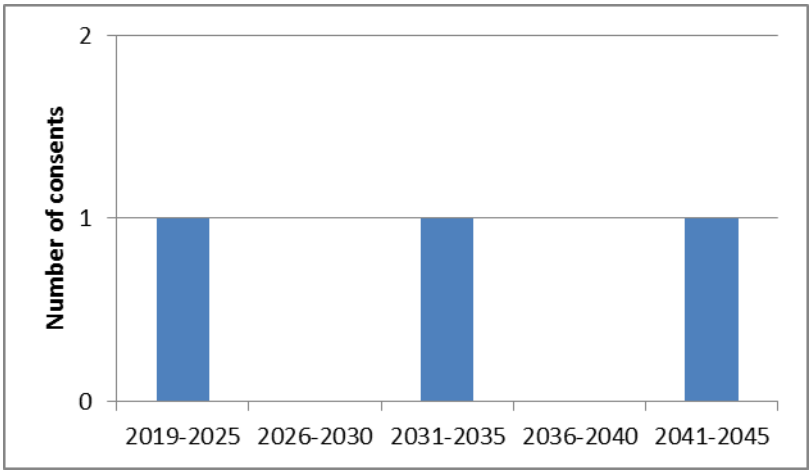

Figure 40: Number of stream depleting groundwater consents from Dobsons Drain by date

Twenty One Drain:

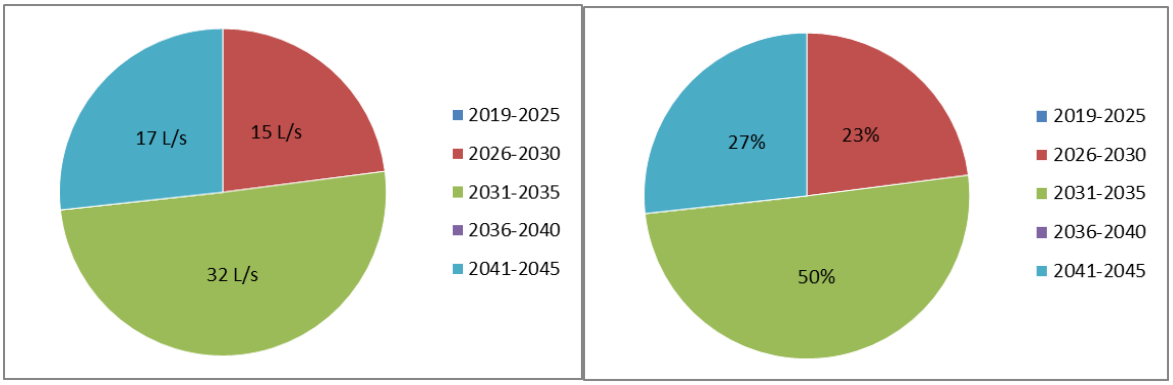

Figure 41: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Twenty One Drain

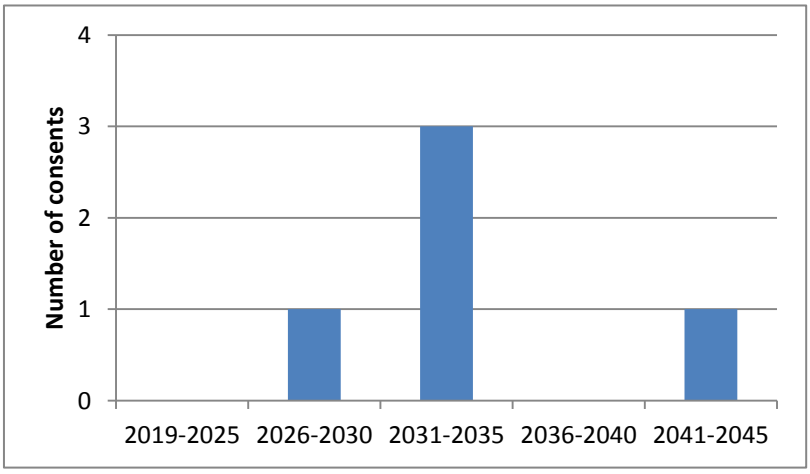

Figure 42: Number of stream depleting groundwater consents from Twenty One Drain by date

Crows Drain:

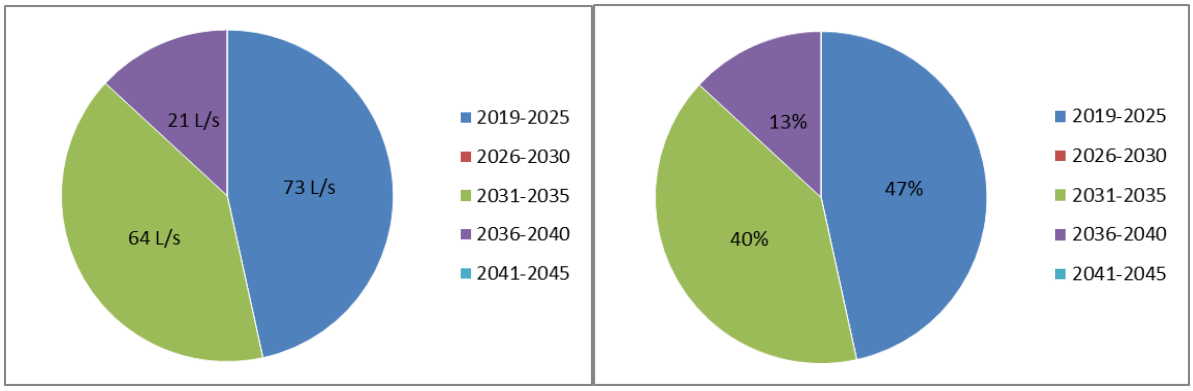

Figure 43: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Crows Drain

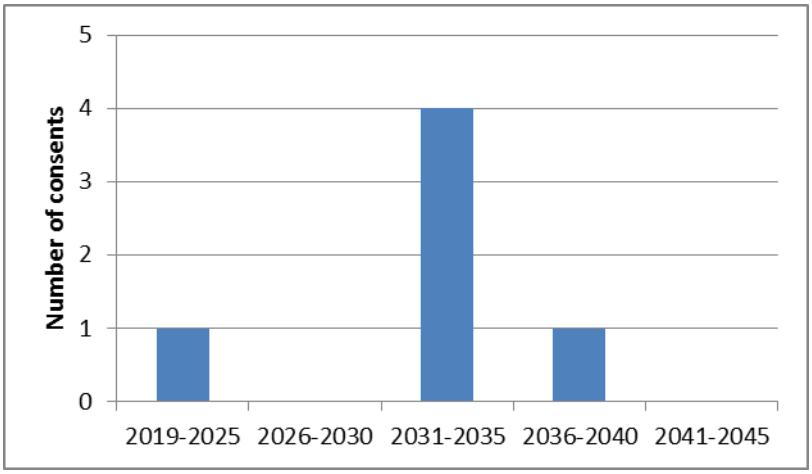

Figure 44: Number of stream depleting groundwater consents from Crows Drain by date

Oakdale Drain:

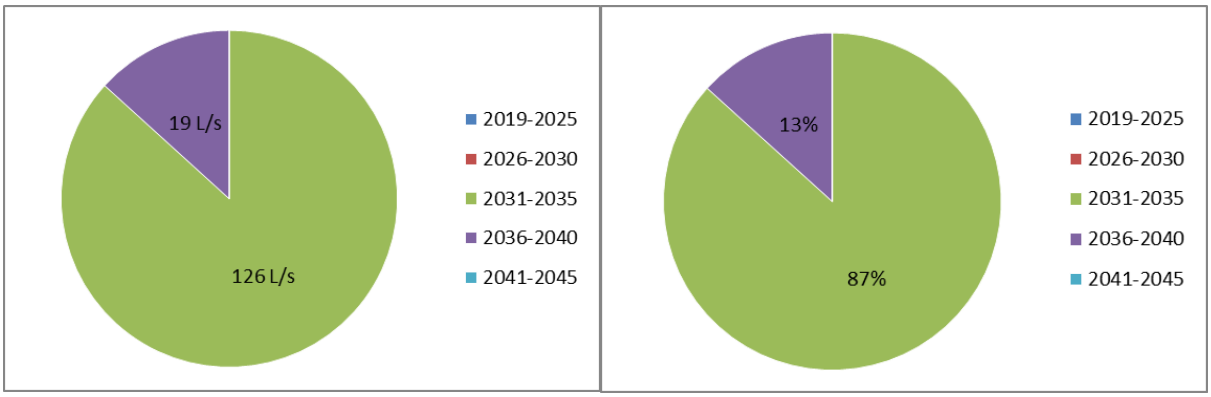

Figure 45: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Oakdale Drain

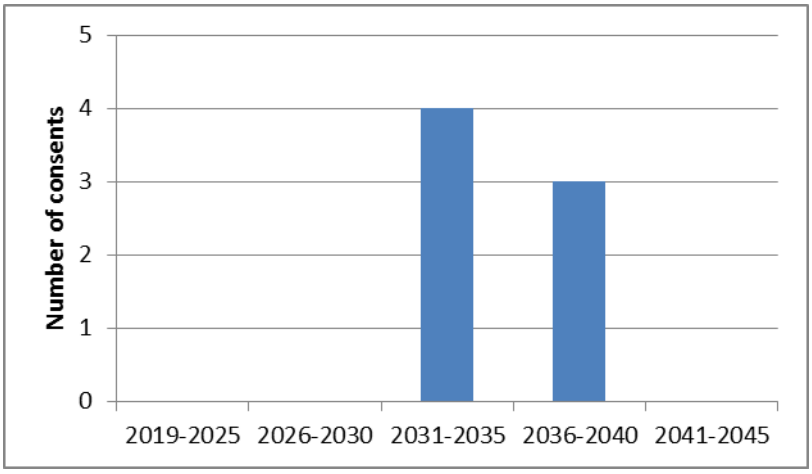

Figure 46: Number of stream depleting groundwater consents from Oakdale Drain by date

Moffats Drain:

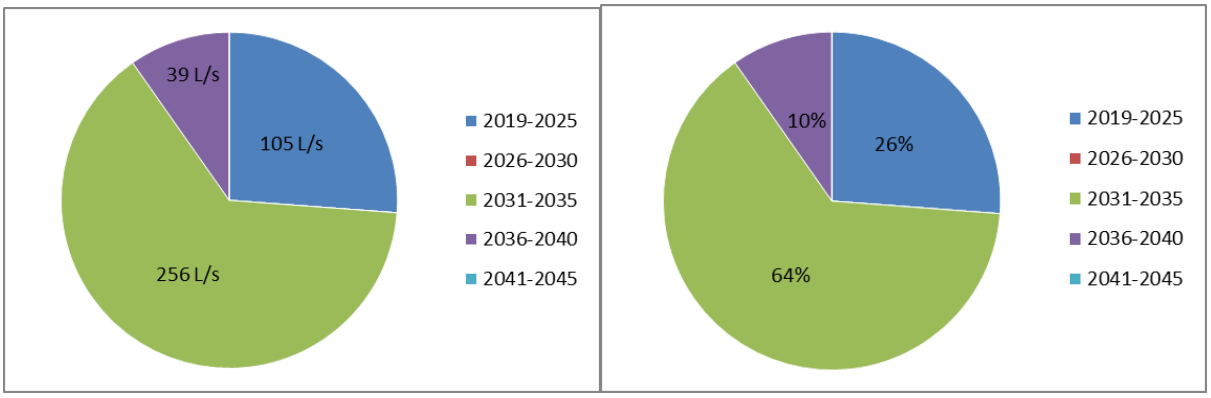

Figure 47: Rate (l/s) and percentage allocation for stream depleting groundwater takes from Moffats Drain

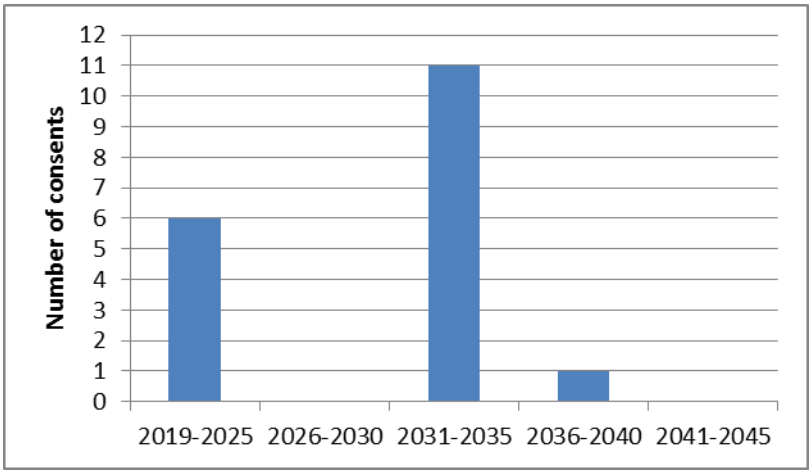

Figure 48: Number of stream depleting groundwater consents from Moffats Drain by date