Prince of Wales/Omāroro Reservoir

Field Raising Options and Related Heavy Vehicle Earthwork Movements

This handout provides a summary of 6 different heavy vehicle earthwork movement options for the proposed Prince of Wales/Omāroro reservoir development, based on different scenarios for:

- **Field raising:** raising, or not raising, the upper and/or lower playing fields at Prince of Wales Park, using some of the surplus excavated material from the proposed reservoir site and
- **Heavy vehicle hours of operation:** controlling the days of the week and hours of operation over which heavy vehicles are able to access and exit the proposed reservoir development site for earthworks.

This handout is intended to support further discussions with submitters in mid-January 2018, which will specifically consider all field raising and earthwork movement options.

For transparency the handout identifies a **proposed option** (**option 5**- detailed below), for field raising and controlling heavy vehicle earthwork movements, that Wellington Water is currently considering.

Proposed option 5 has been developed following Wellington Water's review of:

- submissions on the proposed Prince of Wales/Omāroro reservoir notice of requirement, and
- the outcome of further geotechnical and costing evaluation work completed by Wellington Water related to the potential raising the lower playing field.

The outcome of submitter discussions will be used by Wellington Water to confirm its final **preferred field raising and earthwork movement option** that it will put to Wellington City Council for specific consideration at submission hearings in early March 2018.

Included in this handout are:

1. **The reservoir development programme**
2. **Field raising options, site access hours and effect on related heavy vehicle earthwork movements**
3. **Earthmoving vehicle movements**
4. **Optimised duration of earthwork related heavy vehicle movements.**
5. **Visual simulation for the raised Upper Field - Hargreaves Street**

1. Reservoir Development Programme

Table 1 details which vehicle types will require access to and from the proposed reservoir site during the various phases of its development. Over 80% of all heavy vehicle movements to the and from the site will earth moving trucks.

Table 1 - Vehicles Movement Type by Programme Phase

	Initial Excavation	Reservoir Construction + Remaining Excavation	Reservoir Construction + Pre-Cast Deliveries	Reservoir Construction	Backfill
Earth moving trucks	✓	✓			✓
Concrete trucks	✓	✓	✓	✓	
Pre Cast Deliveries			✓		
Other Deliveries	✓	✓	✓	✓	✓
Staff	✓	✓	✓	✓	✓

2. Field Raising Options, Site Access Hours and Effect on Related Heavy Vehicle Earthwork Movements

Six options (summarised in **Table 2** below) have been modelled to illustrate and compare different heavy vehicle traffic movements for earthworks related to:

- **Field raising**: raising or not raising the upper and/or lower fields (using surplus excavated earthworks from the excavated reservoir site), and
- **Truck movements- days and hours of operation**: 2 different scenarios are covered for the days and hours of operation over which heavy earthwork vehicles could access and exit the proposed reservoir development site:
    - 6 days a week, weekdays 9am- 3pm and Saturday 7:30am- 6pm (as proposed in the Prince of Wales/Omāroro reservoir Notice of Requirement)
    - 5 days a week, 9am- 6pm weekdays only, proposed through community feedback.

None of these scenarios are expected to alter the expected movement volumes and patterns of non-earthwork related heavy vehicles required to support the development of the reservoir (i.e. concrete truck trucks, precast deliveries, other deliveries etc).

Table 2 – Field raising and earthwork truck movement options

Option	Upper Field raising	Lower Field raising	Earthwork Truck Movements Days & Hours of operation	Surplus earthworks to be disposed (m^3)
1. Raise NEITHER (6 day)	-	-	6 days 9-3pm weekdays 7:30-6pm Saturdays	30,000
2. Raise BOTH (6 day)	✓	✓	6 days 9-3pm weekdays 7:30-6pm Saturdays	14,000
3. Raise NEITHER (5 day)	-	-	5 days 9am- 6pm weekdays	30,000
4. Raise BOTH (5 day)	✓	✓	5 days 9am- 6pm weekdays	14,000
The proposed option **5. Raise UPPER only** (5 day)	✓	-	**5 days** **9am- 6pm weekdays only**	**22,000**
6. Raise UPPER only (6 day)	✓	-	6 days 9-3pm weekdays 7:30-6pm Saturdays	22,000

Figure 1 compares each of the 6 options showing:

- **Average number of earthwork related heavy vehicle movements <u>per day</u>** over each relevant active phase of the project

Figure 12 compares each of the 6 options showing:

- **Average number of earthwork related heavy vehicle movements <u>per hour</u>** over each relevant active phase of the project

Heavy vehicle movements in this figure are derived from **Tables 3.**

Key assumptions applying to Figures 1 and 2: *Heavy vehicle movements per day and per hour for each option are calculated over the full duration of each phase (i.e. phase 1: Initial excavation is expected to take 5 months to complete, so average earthwork vehicle movements per day and per hour to remove surplus material are calculated over the full 5 month duration of this phase).*

Figure 1 Comparison of **Average Heavy Vehicle Earthwork Movements per day,** by option and project phase

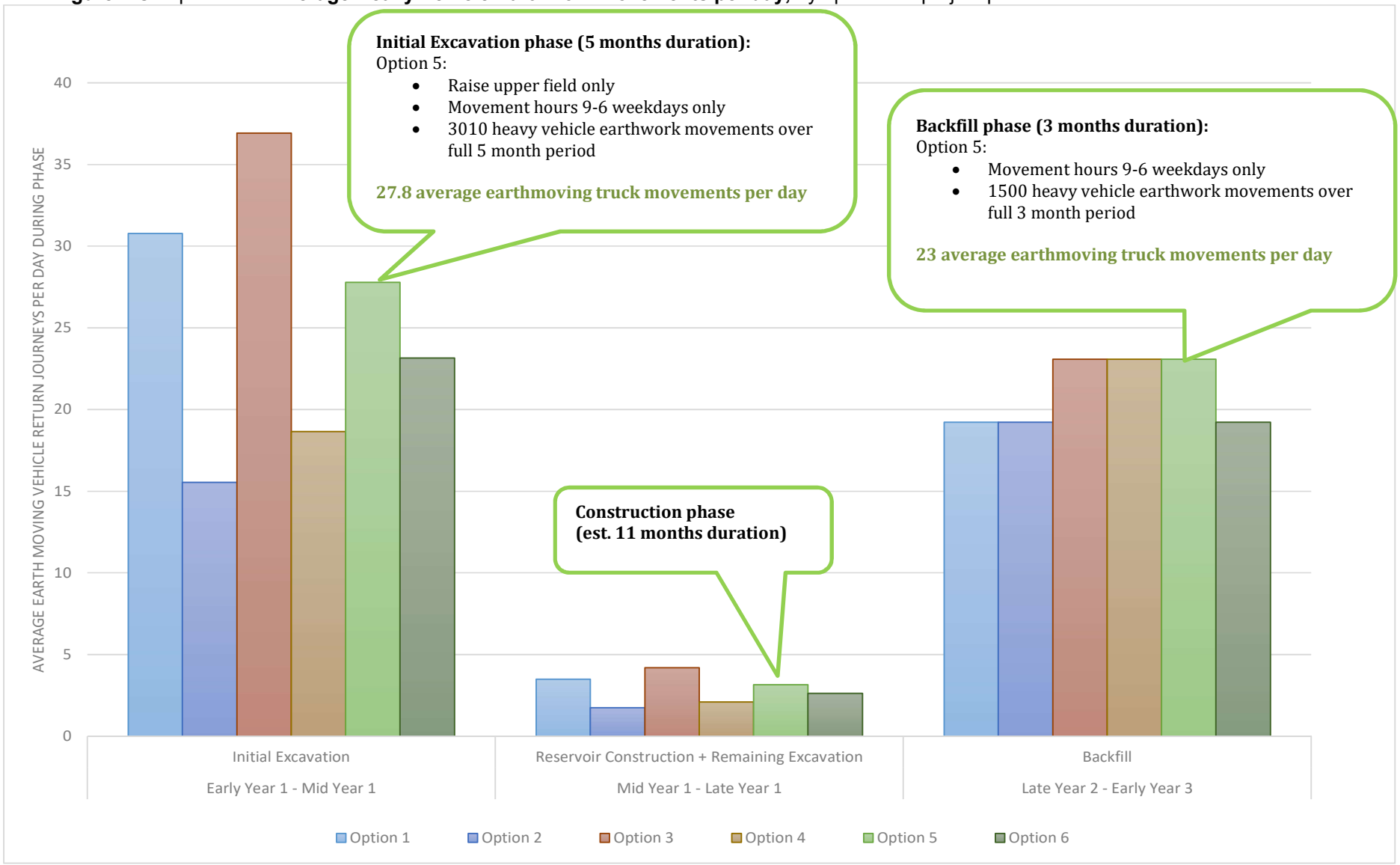
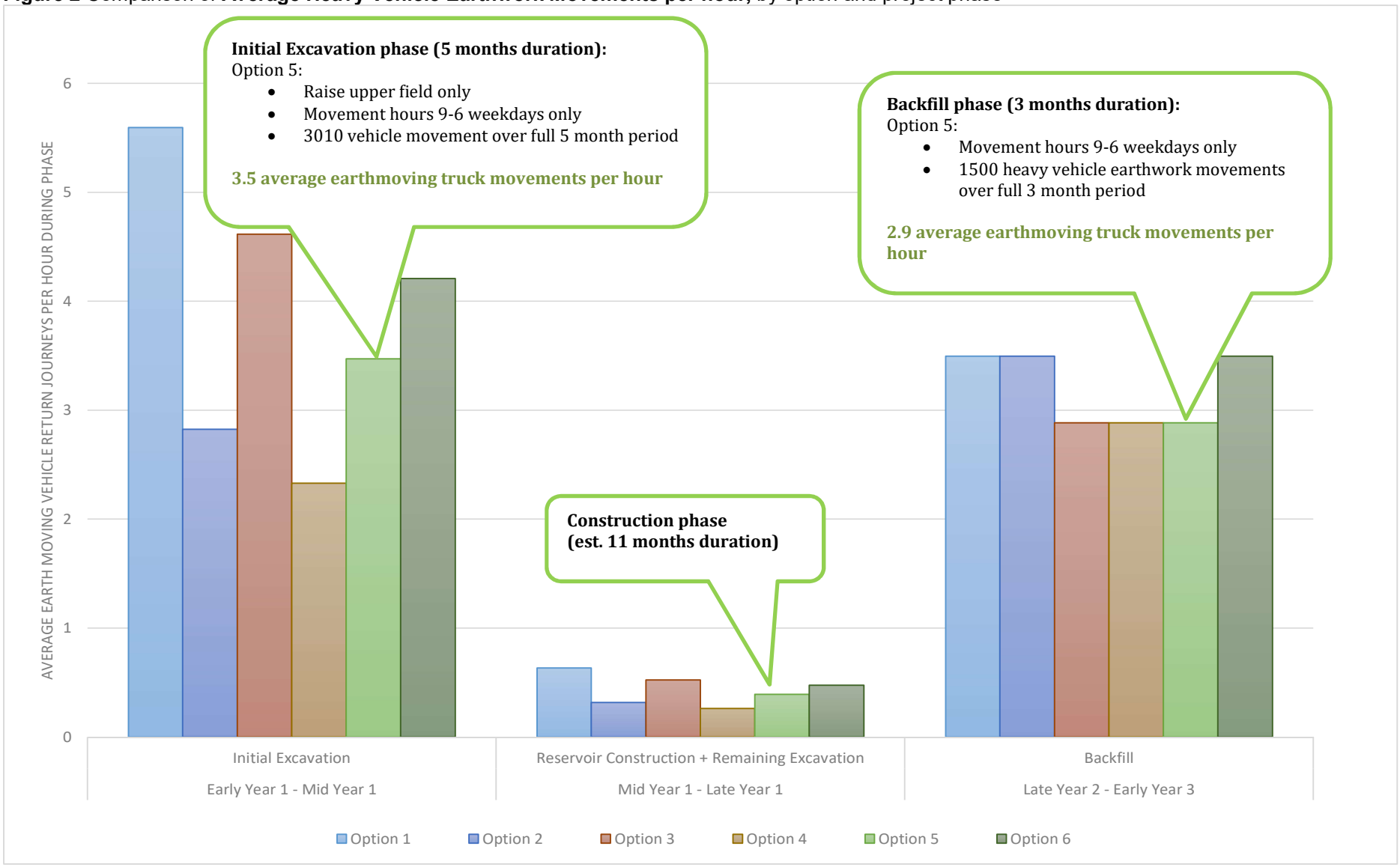


Figure 2 Comparison of **Average Heavy Vehicle Earthwork Movements per hour,** by option and project phase



3. Earth Moving Vehicle Movements

The expected number of earth moving trucks required to access the site to dispose of surplus earthwork material for each option is shown **Table 3**.

Table 3 - Number of Earth moving vehicles* by Programme Phase and Option

Phase	Option 1	Option 2	Option 3	Option 4	Option 5 (the proposed option)	Option 6
Initial Excavation	4,000	2,020	4,000	2,020	3,010	3,010
Reservoir Construction + Remaining Excavation	1,000	500	1,000	500	750	750
Backfill	1,500	1,500	1,500	1,500	1,500	1,500
Total	**6,500**	**4,020**	**6,500**	**4,020**	**5,260**	**5,260**

* Trucks assumed to be 8m^3 rigid units.

The return trip from the proposed site to the landfill is 16km and ranges in duration from 40 minutes to one hour (peak hour at 5–6 PM).

4. Optimised Duration of Earthwork Related Heavy Vehicle Movements

If heavy vehicle movements required for surplus earthworks disposal are optimised and are not spread over the full duration of each project phase in which they will occur, the time that it may take for earth moving trucks to clear surplus earthwork material from the site to the landfill (assuming surplus material is constantly available for optimised transportation from the site), will differ across each option.

This difference will be based on the:

- volume of material that needs to be disposed of,
- the rate at which heavy vehicles can be loaded,
- the available operating hours per day that heavy vehicles will have to access the site to remove the material, and
- the capacity of Rolleston Street to efficiently convey earthwork truck movements.

The duration of ‘optimised’ earthwork related heavy vehicle movements (i.e. the shortest duration over which they may be able to be completed) is shown in **Figure 3**.

The ‘planned phase’ bar in Figure 3 shows the expected duration of the work phase (i.e. for initial excavation phase, the time it is expected to take to complete actual excavation works).

The assumptions used in the calculations for Figure 3 are shown in **Table 4**.

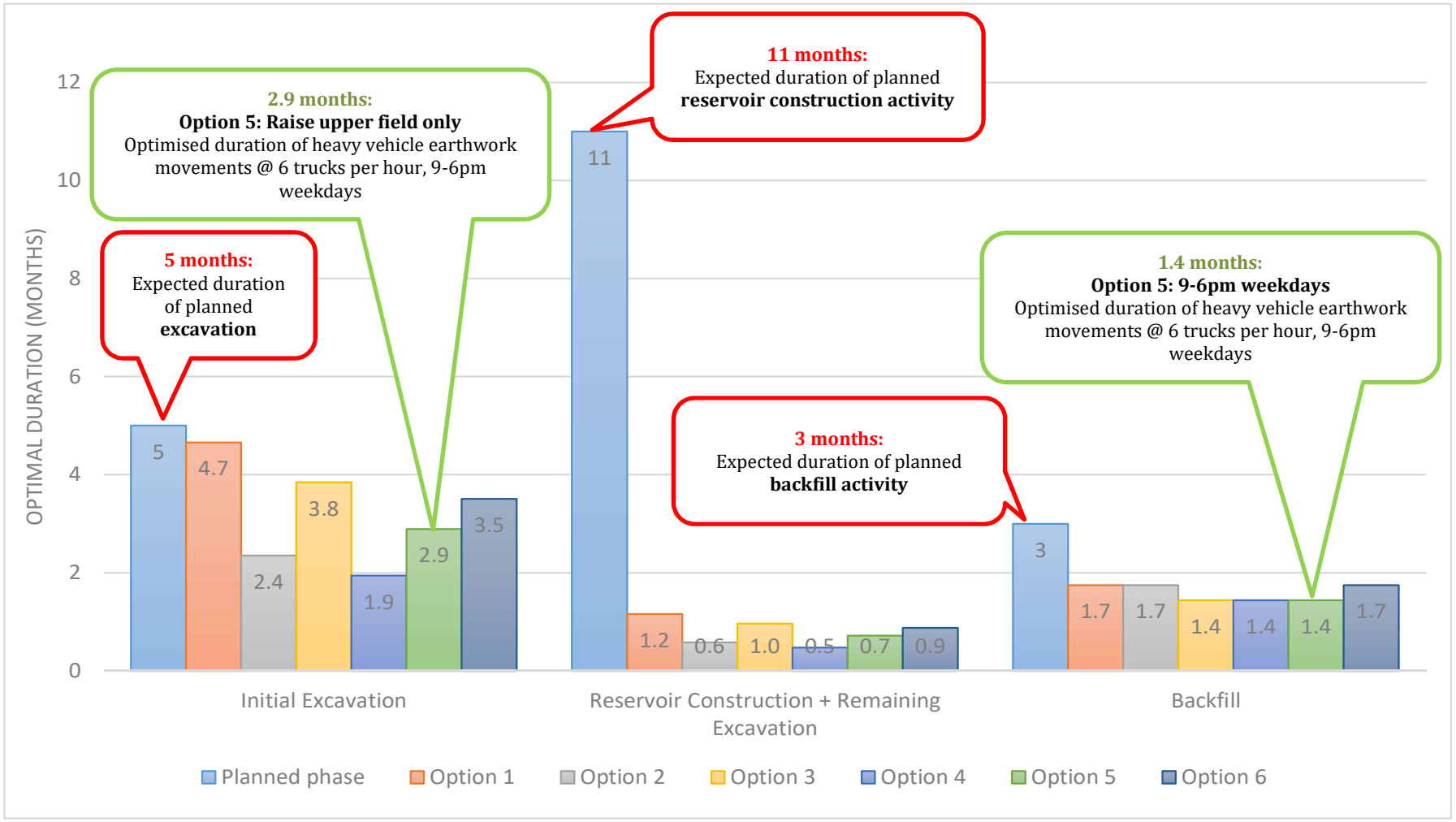
Table 4 - Assumptions used in estimating earth moving truck duration

	Option 1	Option 2	Option 3	Option 4	Option 5 (the proposed option)	Option 6
Trucks per hour**	6	6	6	6	6	6
Operating hours per day	5.5	5.5	8	8	8	5.5
Operating days per week	6	6	5	5	5	6

**The trucks per hour are based on how quickly they can be filled on site.

At optimal levels, trucks can be filled every 4-5 minutes (10-12 trucks per hour). Given other external factors that may impact the operation (I.e. pace of earthwork activity on site, availability of surplus material to be moved, truck delays due to traffic etc) we have assumed a reduced average rate of 6 trucks per hour.

Figure 3 Comparison of **Optimised Duration of Earthmoving Truck Activity (months)** by option and programme phase



5. Visual simulation for the raised Upper Field - Hargreaves Street

Viewpoint Location Map

Wellington Water