BEFORE THE COMMISSIONERS
APPOINTED BY THE DUNEDIN CITY COUNCIL

IN THE MATTER	of the Resource Management Act 1991 (the **Act**)
AND	Variation 2 to the Dunedin City Council Second Generation District Plan (**Variation 2**)
BETWEEN	**GTJM PROPERTY LIMITED**
	Submitter (OS263)
AND	**DUNEDIN CITY COUNCIL**
	Territorial Authority

BRIEF OF EVIDENCE OF GRACE ELIZABETH RYAN

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SUMMARY OF EVIDENCE

1. My name is Grace Ryan, I am a Senior Traffic Engineer employed at GHD. My evidence is given on behalf of GTJM Property Limited to assist in assessing the transportation issues, in relation to the Proposed Variation 2 to the Dunedin City Council Second Generation District Plan, with the potential rezoning from *Rural Residential 2* to *Township and Settlement*, and subsequent subdivision of the land at 336 and 336A Portobello Road, The Cove (known as Greenfield 14; GF14).

2. I have reviewed the Integrated Transport Assessment (ITA) dated December 2021 by GHD and provided technical support to the ITA author and the concept designer. I have personally been to site as recently as this month. I have read the relevant reports prepared on behalf of Dunedin City Council for Variation 2.

3. I have read the water wastewater stormwater infrastructure assessment and geotechnical report (by Fluent Solutions and by Terra Managed Design and Construction, respectively) prepared on behalf of GTJM Property Limited and submitted to Council in June 2022. These assessments touch on some aspects with relevance to the expected transportation effects of the proposal. These aspects include water supply for firefighting, piped stormwater and wastewater drainage, and type of retaining walls. In light of the discussion in those reports I consider that that works anticipated by these disciplines will be compatible with the concept design prepared by GHD including access for firefighting vehicles, inclusion of kerb & channel for drainage, and indicative extents of retaining walls.

4. I conclude that the vehicle trip generation from an additional nine dwellings in the GF14 site would generate negligible additional transport movements and broadly would not require a different type of intersection control from the existing uncontrolled priority T-intersection with Portobello Road. The proposed upgrade of Weller Street and improvements at the Weller Street / Portobello Road intersection, included with the development, will substantially improve the safety and access of the existing intersection and street, and

more than mitigate the minor adverse efficiency effects that would otherwise occur with increased transportation demand on Weller Street as it exists.

5. I consider that the GF14 site has good walking, cycling, and public transport connectivity to both the main urban area of Dunedin city and Portobello village via existing transport infrastructure and services. This proximity can thereby promote reduced dependency on private vehicles; support mode choice; and provide future residents with good access to recreation, education, employment, amenity and social opportunities. These outcomes are as directed by Policy 2.2.2.4 and Policy 2.3.3.1.

6. I consider that the proposed rezoning within the existing urban area and facilities reflects Policy 2.6.2.1, and enhances access existing community facilities. The improvements to Weller Street and at the Weller Street / Portobello Road intersection would address the existing poor condition of the existing transport infrastructure and represent lower long-term maintenance and renewal costs for Council, as directed by Policy 2.7.1.2. I consider that the proposed wider carriageway and new footpath supports the safe and efficient operation of the multi-modal transport network as directed by Policy 2.7.2.1 and Policy 2.7.2.2. The upgrades will also address the existing poor intersection legibility and existing lack of access for emergency vehicles and waste collection.

7. I consider that, with the level of analysis and 3D concept design undertaken to date, the effects of the proposal on the Council transport network would be less than minor at the Portobello Road intersection and substantially positive in terms of the efficiency and safety of Weller Street.

QUALIFICATIONS AND EXPERIENCE

8. I hold a Bachelor of Engineering (Honours) in Civil and a Master of Engineering in Transportation. I am a registered Chartered Professional Engineer, a Chartered Member of Engineering New Zealand, and a Chartered Member of the Chartered Institute of Logistics and Transport. I have been active in industry organisations

for several years, including the Engineering New Zealand Transportation Group branch and national committees, the Chartered Institute of Logistics and Transport southern section committee, and the Women in Urbanism Ōtautahi chapter.

9. I have ten years of experience working as a professional transport engineer in New Zealand. I am based in Christchurch and work on transport projects across New Zealand. The projects are often multi-disciplinary, spanning across urban, peri-urban and rural contexts.

10. I have worked on a broad range of traffic engineering, transport planning, transport design, transport business cases, road safety, and multi-modal transport assessment and design projects. The projects are primarily for national and local government organisations.

INVOLVEMENT WITH THE PROPOSAL

11. My involvement in the proposal to date includes the following roles:

    (a) GHD Project Manager to provide transport advice to GTJM Property Limited;

    (b) Co-author of the Weller Street Planning Advice Letter (GHD; August 2020);

    (c) Technical reviewer of the Integrated Transport Assessment (ITA) (GHD; December 2021);

    (d) Review as Project Manager of the Concept Design and associated Technical Memorandum (GHD; February 2022)

    (e) I have been on-site recently (July 2022) and have used various tools to understand the nuances of the site, including colleagues site records (geometric and traffic behaviours);

12. In my role at GHD, I have had oversight of the recent changes at the Weller Street intersection constructed in 2020, prior to the proposed Variation 2 rezoning. I was involved in design and construction supervision support for the Peninsula Connection project, which included undertaking major road improvement works along Portobello Road, including: the new shared path past Weller Street, the new on-street parking and eastbound bus stop opposite Weller Street, and the

new footpath and westbound bus stop immediately east of Weller Street. This oversight of these recent changes has provided me with an understanding of the intersection as it exists both now and prior to the recent Portobello Road improvement works. I am also familiar with the wider traffic environment surrounding the site.

CODE OF CONDUCT

13. I confirm I have read the 'Code of Conduct for Expert Witnesses' contained in the Environment Court Practice Note (2014). I have complied with this Code of Conduct in the preparation of this evidence, and will follow the Code when presenting this evidence. Unless I state otherwise, I confirm the matters addressed in this written statement of evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express. I have outlined all data, information, facts, and assumptions made in forming my opinions.

SCOPE OF EVIDENCE

14. This evidence has been prepared to address the transportation matters of concern identified in submissions seeking that the rezoning of 336 and 336A Portobello Road be rejected and the section 42A report. In particular:

    (a) The existing context of the site

    (b) The existing intersection of Weller Street and Portobello Road;

    (c) A summary of transport matters relating to the ability to complete improve to Weller Street to safely and efficiently accommodate the proposed development, including;

        (i) Site connectivity for all transport modes;

        (ii) Intersection design and sight distances for entering and exiting Weller Street;

        (iii) Traffic generation estimates for existing and proposed context;

(iv) Proposed form of Weller Street, with regard to the ability to achieve the standards required by the Dunedin Code of Subdivision and Development (2010) and NZ Standard 4404:2010 Land Development and Subdivision Infrastructure, section 3 Roads;

(v) Types of vehicles expected and vehicle tracking checks, including emergency vehicle access;

(vi) Construction activities;

(vii) Further design aspects to address;

(d) Response to transportation matters of concern;

(e) Summary of transportation effects.

15. My evidence references the following attachments:

(a) **ATTACHMENT A** – Integrated Transport Assessment (GHD, December 2021)

(b) **ATTACHMENT B** – Concept Design and Concept Design Technical Memorandum (GHD, February 2022)

(c) **ATTACHMENT C** - Figures for evidence

SUMMARY OF TRANSPORT MATTERS

Existing context

16. I note that the existing environment of the site reflects the road hierarchy classification of Weller Street as a 'Local' road. It currently has a narrow single lane that operates two-way, with a steep gradient upward from Portobello Road. It is a no-exit road that provides access to eight existing residential dwellings (numbers 335, 338 – 343, and 346 Portobello Road).

17. I note that there is a private driveway located immediately west and above Weller Street, which provides access to three existing residential dwellings (numbers 330, 332, 333 Portobello Road). This driveway has been included in assessments, given its close proximity and operational interaction with the Portobello Road / Weller Street

intersection. I have observed the potential for confusion between Weller Street and this access, causing poor existing legibility of the intersection. **Refer To ITA Figure 1 and Figure 2, as ATTACHMENT C.1 and ATTACHMENT C.2.**

18. Weller Street has an estimated Average Annual Daily Traffic (AADT) of 20 vehicles per day (vpd) (estimate dated 1 June 2020; current estimate for 10 May 2021 is unchanged), according to the Waka Kotahi MobileRoad database. Weller Street is considered to be a '*Minor Residential (cul de sac)*', as per Table 3.1R of the Dunedin Code of Subdivision and Development (2010)[1].

19. The site gains access via the priority intersection on Portobello Road Portobello Road has a road hierarchy classification of an 'Arterial' road. It provides a two-way, two-lane cross-section, and is the only road access from The Cove to the main urban area of Dunedin. Portobello Road has an estimated AADT of 5,400 vpd (date recorded 28 January 2019) Waka Kotahi MobileRoad database.

Existing intersection

20. Weller Street connects into Portobello Road at a sharp angle of approximately 10 degrees. This angle aligns with the dominant movements observed to be made at this intersection i.e. to/from Dunedin. For the few movements observed travelling to/from Weller Street towards the east, these motorists typically performed U-turns, using the wider carriageway width in front of the wastewater pump station and the bus stop. In other instances, motorists were also observed crossing into the opposing lane to complete the left turning manoeuvre into Weller Street. This behaviour was observed by GHD when recording turning movements for the ITA and has been anecdotally confirmed by others I have consulted with[2]. **Refer To ITA Figure 3, as ATTACHMENT C.3**

[1] Dunedin City Council, Dunedin Code of Subdivision and Development, August 2010. https://www.dunedin.govt.nz/__data/assets/pdf_file/0019/153163/CP-Dunedin-Code-of-Subdivision-Aug-2010.pdf

[2] Pers Comms Joe Morrison, Darryl Sycamore and Doug

21. I note that the existing width of Weller Street does not provide access for waste collection and delivery, emergency vehicles, or heavy vehicles. Waste collection and mail/parcel delivery occurs communally on Portobello Road shoulder at the wastewater pump station (where wheelie bins and mailboxes are located). This requires residents to convey wheelie bins along Weller Street, and contend with the uneven surfacing, steep gradient, narrow width, and lack of path provision. **Refer to ITA Figure 4, as ATTACHMENT C.4**

22. I note that firefighting appliances are unable to access Weller Street, and that access may be difficult for other emergency vehicles, such as ambulances. I understand that that this lack of firefighting access is compounded by the existing lack of hydrants on Weller Street (with only a private small water supply connection used by existing residences as described in the Fluent three-waters report).

23. I note that Weller Street has a constrained narrow sealed width of approximately 3 m, with retaining walls and heavy vegetation on both sides. This width effectively limits operation to one-way traffic, with no passing opportunities until the road splits into two private driveways (100 m from Portobello Road). There is no specific provision for pedestrians and cyclists. The existing road construction appears to be concrete with thin asphalt surfacing. The existing pavement condition is considered to be very poor, with uneven surfacing, and rutting and ravelling of the surfacing observed. **Refer to photos taken in July 2022, as ATTACHMENT C.5 and ATTACHMENT C.6.** The road has a steep gradient of approximately 8% increasing from Portobello Road. There is no street lighting at the Weller Street intersection with Portobello Road. There is a single streetlight at the existing end of Weller Street, some 100 m from Portobello Road in private land, **as shown in ATTACHMENT C.6**.

24. I consider Portobello Road westbound drivers would have adequate visibility of a vehicle stopped on Weller Street. However drivers stopped on Weller Street would have restricted view to oncoming westbound vehicles, due to the angle of their vehicle, and would have to rely on their wing mirror to see westbound behind them on Portobello Road.

25. Portobello Road eastbound drivers would have poor visibility of vehicles waiting to turn from Weller Street, as vehicles on Weller Street would be slightly obscured behind the adjacent driveway (for 330, 332, 333) and the bend in Portobello Road. Drivers stopped on Weller Street have some sight distance to oncoming eastbound vehicles, depending on driver eye height and how far forward they position their vehicle.

26. I reference the ITA section 2.3 which outlines the minimum sight distance requirements for the Portobello Road / Weller Street intersection, including: Approach Sight Distance (ASD); Safe Intersection Sight Distance (SISD); Minimum Gap Sight Distance (MGSD); Crossing Sight Distance (CSD), referencing Austroads Guide to Road Design Part 4A. **Refer to ATTACHMENT C.7 which illustrates these different types of sight distance.**

    (a) The ASD requirement of 40 m along Weller Street is likely not achieved, but I consider this acceptable. It is less critical, as the intersection is obvious to descending drivers and as the majority of drivers are considered to be familiar with the intersection as either residents or their visitors. I estimate the existing ASD to be approximately 35 m.

    (b) The SISD requirement of 181 m along Portobello Road is currently not achieved for eastbound drivers. This sight line for eastbound drivers extends past the pump station and adjacent access, with a localised embankment obstruction (i.e. face of bank on south side of Portobello Road). I estimate the existing SISD to be approximately 60 m.

    (c) The MGSD requirement of 111 m along Portobello Road is currently not achieved for right turns from Weller Street to Portobello Road. Due to the acute angle, this movement is not completed in one movement but instead undertaken as a two-stage movement, where drivers pull out left onto Portobello Road where sight distance to the west is achieved, and then U-turn using the bus stop area. Therefore the MGSD for right turns is not considered to be applicable.

    (d) The pedestrian CSD requirement of 148 m is obstructed to the west for pedestrians crossing south to north, due to the localised

embankment obstruction. I estimate the existing CSD to be approximately 60 m.

27. I note that since the ITA was written, there have been speed limit changes implemented in 2021, which have reduced the posted speed limit on Weller Street to 40 km/h. This is the same as the assumed 85th percentile operating speed adopted in the ITA for the purposes of assessing sight distance.

28. I note that the ITA had assumed posted speed limit of 50 km/h on Portobello Road, however this is incorrect as the current Portobello Road speed limit is 70 km/h. When assessing sight distance, the 85th percentile operating speeds are applied. Unless speed survey data is available, the 85th percentile operating speed is typically assumed to be 10 km/h above the posted speed limit. Accounting for the 70 km/h posted speed limit on Portobello Road has the effect of increasing the adopted 85th percentile operating speed to 80 km/h and increasing the SISD, MGSD and CSD requirements. I have re-assessed the sight distance requirements on that basis to confirm that the assessed sight distance outcomes concluded from the ITA are not materially different.

Active mode and public transport connectivity

29. As part of recent upgrades for the Peninsula Connection project, there is a shared path on the seaward side of Portobello Road. This supports walking / cycling trips, for recreation, commuting, and access to public transport at the nearby bus stops.

30. The proposal may increase the commuting and recreational demand for the seaside shared path and pedestrian crossing demand Portobello Road at Weller Street. It is expected that the majority of recreational demand will occur outside the peak traffic periods, i.e. having limited interactions with Portobello Road traffic. Demand created by commuters using the shared path is likely to occur in peak periods. I note that Mr Morrison mentions in his evidence that he and his partner intend to use the shared path when they live at the property.

31. There is an existing eastbound bus stop opposite Weller Street and a westbound bus stop immediately east of Weller Street, which are serviced by route 18 (between Dunedin City and Harington Point).

Route 18 bus services runs with a 30 minute peak frequency and 60 minute off peak frequency.

Safety

32. I note that the ITA outlines a review of the Police-reported crash analysis system (CAS) for a five-year period between 2016 and 2020. This identified that two crashes recorded on Portobello Road within proximity to the site, however neither were attributable to the Weller Street intersection. Both crashes had a common factor of wet weather. A minor injury crash 30m west of Weller Street was a road rage incident. A non-injury crash 55 m west of Weller Street involved a U-turn movement which was unrelated to Weller Street. No crashes were recorded in CAS in the ten years prior or since the ITA was written.

33. While there have been no crashes associated with the U-turns to enter / exit Weller Street from the east on Portobello Road, I consider that this may partly reflect the low frequency of such movements by familiar drivers, and that some drivers undertake the movement in two stages (using the eastbound shoulder). These U-turns movements are not an ideal from a road safety perspective, because of the risk of death or serious injury associated with the side impact conflict type, because other drivers may not anticipate the movement, and because U-turning drivers are required to make complex gap acceptance decisions.

Traffic generation

34. I note that the ITA outlines the observed peak hour vehicle movements and the estimate of the existing vehicle trip generation for the residential dwellings accessed via Weller Street and the adjacent private driveway in 2021. The majority of traffic was observed travelling to/from the west towards Dunedin city centre.

35. I reiterate the AM and PM peak hour vehicle trip generation for the existing 11 dwellings (eight on Weller Street and three on private driveway) as per the ITA is:

    (a) AM Peak: **10 vehicle movements** for 11 dwellings; rate of 0.9 (20% in / 80% out)

(b) PM Peak: **6 vehicle movements** for 11 dwellings; rate of 0.5 (67% in / 33% out)

36. On the basis of the above observations, I note the future trip generation was estimated by applying the same trip rates to reflect nine new dwellings. As Weller Street would remain a cul-de-sac, there are no other trip generation changes are expected. I reiterate the estimated future trip generation as per the ITA is:

(a) AM Peak: **18 vehicle movements** for 20 dwellings

(b) PM Peak: **11 vehicle movements** for 20 dwellings

37. I agree with the ITA conclusion that the current and expected future peak hour vehicle movements on Weller Street are considered to be minimal, such that the intersection is considered to have easily sufficient capacity. These new movements would represent 2 – 3% of the current volumes on Portobello Road during peak hours, which is well within typical daily variation on urban roads which can be +/- 10% as a rule of thumb. Therefore, the inclusion of the proposed development would result in less than minor adverse capacity effects on the road network.

Proposed Weller Street intersection with Portobello Road

38. To assist in assessing the feasibility of the developing the proposed site GHD were instructed to prepare a concept design for the intersection and road. I did not complete the concept design work myself, it was done by my colleague Riaan Steenkamp. However, I have reviewed the concept design, discussed it with Mr Steenkamp and undertaken a site visit together since it was prepared. On this basis I can confirm that I consider the concept design to be appropriate and feasible for the location.

39. The concept design (February 2022) proposes significant physical works to reconstruct and extend Weller Street, between the Portobello Road / Weller Street intersection and the subject site. The road reconstruction works identified will also include earthworks, new retaining walls, new road drainage, and line-marking. In my opinion the reconstruction works provide an opportunity to implement

significant transport improvements to mitigate some of the existing transport constraints.

40. The broad location and form of the Weller Street priority T-intersection will not change significantly due to prevailing geographical constraints. No changes to Portobello Road are proposed. I agree that maintaining a similar T-intersection arrangement is appropriate for the context and volumes.

41. The concept design shows a reconfiguration the private access located immediately west (above) Weller Street to a single intersection on Portobello Road. The three dwellings served by this private access would have access via the reconfigured Weller Street. This change will increase available width for the intersection, improve the legibility of the Weller Street intersection, make turning movements easier and more predictable, and modestly improve sight distance to the west. This design addresses a number of the existing transport safety concerns created by the current configuration which I discussed above at paragraphs 20 to 33. It would be possible to complete upgrades of Weller Street without reconfiguring the adjacent private access, but it would mean the legibility issues would remain, prevent sight distances from being improved and result in a longer one-way section on Weller Street itself. In my opinion none of these matters are fatal to improvements being made, but GHD's advice to GTJM Property Limited has been to adopt a concept design that addresses as many of the existing safety concerns as feasible.

42. I consider that the concept design will improve the existing intersection in several ways:

    (a) Consolidating the intersection and adjacent access would improve intersection legibility and sight distances.

    (b) Widening at the base of the intersection would ease turning movements and accommodate two-way vehicle access over a short distance of approximately 10 m (i.e. allowing a single car to stop without blocking Portobello Road)

(c) Re-grading at the base of the intersection would provide a nearly flat manoeuvring area and allow longitudinal drainage along Portobello Road (i.e. a 0.5% grade over a short distance)

43. The concept design offers improvements on the existing intersection sight distance constraints:

(a) The Approach Sight Distance would be maximised along the relatively straight alignment of Weller Street for descending drivers approaching the intersection. Therefore the concept design achieves the required 40 m visibility of the intersection painted limit line at Portobello Road, such that the intersection would be obvious to downhill drivers on Weller Street.

(b) The sight distance to / from the west past the pump station would be improved with the intersection being shifted slightly west. The Safe Intersection Sight Distance requirement to the potential point of conflict along Portobello Road eastbound is still not achieved, but is not made worse. The ITA suggested a warning sign “PW-26 concealed exit” on Portobello Road as mitigation, subject to Council approval and I agree that would be a pragmatic mitigation.

(c) The Minimum Gap Sight Distance for turning movements to the east would be achieved, assuming it would not be impeded by any fixtures on the new retaining wall and any safety barrier on the wall would be terminated back from the intersection. As far as the concept design indicates, it is assumed that drivers would have a clear line of sight to the east over the higher retaining wall and any roadside barrier on the wall. However, the less constrained Portobello Road carriageway width and improved sight distance to the west from the pump station means that some drivers will probably still undertake two-stage right turns out of Weller Street, as they are observed to do now. Though with the proposed improvements more drivers may decide to undertake the right-turn out as a single movement.

(d) The angle of Weller Street onto Portobello Road would be improved from 10 degrees to 20 degrees. This would modestly improve the line of sight to / from the east for drivers exiting

Weller Street, although drivers exiting Weller Street may still require the use of wing mirrors.

(e) The proposal does not alter the Crossing Sight Distance for pedestrians crossing Portobello Road, as it is considered pedestrians would probably still cross at the same location as they do now, near the bus stops.

Proposed Weller Street alignment

44. With regard to the proposed vehicle access roads proposed within private land (Shared Access Lots 11 and 12), I make no assumptions about intentions to vest this land fully or partially unto Council as public road. What occurs in this regard will be determined through any future consent process. However, I provide an assessment below assuming that the access will be public road along its full length.

45. There is an existing private accessway at CH120 which is proposed to be relocated where Weller Street currently ends as a public road (the accessway from here serves seven existing dwellings; 338 – 343 and 346 Portobello Road). This accessway is proposed to be modified such that it connects in a T arrangement with Weller Street. **Refer to ATTACHMENT B, Drawing C010 and the accessway layout on Drawing C011.**

46. The concept design allows for existing buildings that encroach on the subject site, notably the garage at 333 Portobello Road, and dwellings built on the boundary, notably 338 and 340 Portobello Road to remain in-situ. However it is noted that these encroachments have had the effect of adding width constraints, and are proposed to be managed with retaining solutions.

47. The existing public road length of Weller Street is approximately 90 m. The proposed concept design extends the length to approximately 275 m with a turning head at the end. The Concept Design Technical Memorandum (GHD, February 2022) states horizontal alignment consists of gradual right-hand curves on the initial section with reverse curves of 20 m and 25 m radii (from CH90 to CH130), leading into a straight alignment upwards to the cul-de-sac turning head.

48. The Concept Design Technical Memorandum (GHD, February 2022) states that a design speed of 20 km/h to 30 km/h is dictated by the reverse curves, steep vertical grades and width constraint (i.e. built encroachment) at CH30. The section with reverse curves has dictated a design speed of 20 km/h. I agree that due to the low traffic volumes and topographic context, "a higher design speed is not desirable and the achieved design speeds are considered appropriate in view of the road environment". Superelevation on the horizontal reverse is not included in the concept design and this would be considered at detailed design, with associated drainage features.

49. The vertical alignment includes a 12% grade from Portobello Road up to the existing shared access at CH25, with a flatter section to CH80 as the road passes an existing garage to the south. Steeper gradients are required between CH80 to CH180 to reach natural ground level at the top of the turning head.

50. As shown in concept design drawing C010, the vertical alignment of Weller Street has been raised from CH10 to CH50 to accommodate the tie-in with the shared private access at CH25 (for numbers 330, 332, 333 Portobello Road) and connect this access onto Weller Street. The concept design shows tie-ins with existing private accesses at CH120 and CH130 (for numbers 335, 338 – 343, and 346 Portobello Road) as T arrangements on Weller Street, which will more clearly show the priority and legibility of Weller Street.

Proposed Weller Street cross-section

51. The ITA outlines the design requirements considered for the Weller Street cross-section, with reference to the Dunedin Code of Subdivision and Development and the New Zealand Standard NZS 4404:2010 Land Development and Subdivision Engineering (NZS 4404). The Dunedin Code of Subdivision and Development (hereafter 'Dunedin Code') is based on the NZS 4404 guidelines, however it provides additional design information specific to Council requirements. I also note that NZS4404 section 3.3.1 states "*Alternative carriageway widths may be adopted to suit particular design considerations. These shall be subject to specific design consideration and approval by the Territorial Authority*". My evidence

outlines some of these particular design considerations to reflect the site topography.

52. The ITA provides an excerpt of Table 3.1R (Dunedin Code), outlining the relevant design standards that have been considered as applicable for the proposal. **Refer to ITA Figure 19 as ATTACHMENT C.8.** As per the ITA, I consider the '*Minor Residential (cul de sac)*' local road category to be the most applicable Dunedin Code standard for Weller Street. I acknowledge that this category is recommended to serve less than 20 dwellings, and Weller Street is anticipated to have 20. The next local road category '*Residential'* applies for less than 100 dwellings and has the same standard, except for a 30 km/h minimum design speed.

53. I consider that the Dunedin Code requirements for a minimum traffic carriageway width of 6 m to accommodate two-way traffic flow is broadly appropriate for Weller Street, given the low volumes and low speeds, with larger vehicles expected occasionally. Pragmatically, I also consider that the cross-section requirements can be flexibly applied where there are topographical or built constraints, such that the carriageway width could be restricted at locations on the condition that the road can operate safely under expected transport demands. The safety condition is primarily whether sight distance through the constriction is sufficient to allow road users to anticipate conflicts. I also consider that such localised constrictions should be substantially less than 6 m width to clearly indicate one-way operation, for consistent road user expectations and avoiding ambiguity.

54. In preparing this evidence, I have interrogated the concept design developed by GHD, referring to the 3D design files, PDF plans and the concept design technical memorandum. I note the concept design used topographical survey data for the corridor (Terramark, July 2021), cadastral boundary data (LINZ, retrieved August 2021) and the subdivision layout (GTJM Property, November 2021). I believe these data sources are all appropriate and the data applied to the concept design remains current.

55. The concept design proposes a 6 m wide carriageway for the majority of Weller Street, as shown from CH70 to CH 280. Over this length,

the typical cross-section includes 0.25 m width for clearance along the bank side, plus 0.5 m width for kerb & channel and 1.25 m width for a footpath on the seaward side. The typical usable footpath width is 1.4 m width, including the top of the kerb. Where there is indicated to be a retaining wall along the seaward edge of the footpath, approximately 0.6 m additional width is also allowed for the top of a retaining wall and safety barrier, where applicable. I understand that the retaining wall footprints will vary, depending on factors such as: the height retained, type of wall, and the slope of the retaining wall face. The cross-section shows one-way crossfall so that the kerb & channel would capture road and footpath stormwater run-off.

Proposed Weller Street cross-section at constriction

56. The concept design also includes a narrower carriageway CH0 to CH70, as result of a garage encroaching over the boundary with 333 Portobello Road. The carriageway tapers to be 2.7 m from CH30 to CH40 (excluding kerb & channel) such that it will clearly operate with a one-way function from CH10 to CH60.

57. There is sight distance through this narrowed section from CH60 downhill and all the way uphill. This means that conflicts can be anticipated where there is enough width at CH60, to stop and allow opposing movements to proceed (the carriageway width at CH60 is 5.5 m, allowing with approximately 0.5 m clearance to each side and 0.5 m between cars). **Refer to the illustration of sight distances through the constriction as ATTACHMENT C.9.** I consider that detailed design would consider further mitigation with signage, such as advance warning for the constriction or indicating priority to assist drivers negotiating this constriction.

58. I have estimated the statistical frequency of opposing movements for this on-way section, based on the future trip generation for the busiest observed period, being a weekday AM peak hour. I conclude:

    (a) Trip generation estimates that during a future weekday AM peak, Weller Street would carry 18 movements:14.4 vehicles out (down) and 3.6 vehicles in (up). At the 20 km/h design speed through the constriction, it would take 9 seconds to travel the

50 m one-way section. Allowing for a further 3 seconds as decision time, a total of 12 seconds per vehicle could be spent occupying the one-way section. In weekday AM peaks, I determine that the probability of conflicts is less than 0.1%, or occurring around once every seven years. If the AM peak trip generation rate doubled or travel speeds were slower at 10 km/h, this would suggest a conflict occurrence once every two years. Overall, I expect opposing vehicle conflicts on the one-way section of Weller Street to be very rare.

(b) In the case of a conflict occurring, there is sufficient length for a single car to park at the base of the intersection before CH10, and at CH60 to allow an opposing vehicle to pass. The slow travel speed mean conflicts can be anticipated in advance by drivers and negotiated. In an emergency scenario, a motorist may need to reverse or mount the kerb, and the cross-section allows for this. Conflicts on the footpath between cyclist or pedestrians would also typically be rare and anticipated with more time in advance due to slower travel speeds.

(c) I consider that the one-way constriction would not cause efficiency nor safety concerns, due to the very low occurrence rate, slow travel speeds, and the adequate sight distance through the constriction, such that conflicts would be managed without collision.

59. The concept design shows typical footpath is 1.4 m usable width, but through the one-way constriction the path reduces to 1.2 m usable width from CH10 to CH40, and then the footpath tapers to terminate at the intersection with Portobello Road. This footpath width does not comply with the Dunedin Code for two 2.0 m wide paths, instead providing a single path of 1.4 m usable width.

60. I consider that the topographical constraints typical in this context mean that widening for two 2 m wide footpaths as per Table 3.1R is not practical or reflective of low volumes of pedestrians. A single footpath as per the concept design is considered suitable given the limited user catchment. The low volumes and slow speeds on Weller Street may mean that in practice, the traffic lane space would be

preferentially used by pedestrians and cyclists, ultimately functioning as a low-speed shared space where road users negotiate their movements and are prepared to yield.

61. I further consider that this path provision would be usable for able-bodied pedestrians and some users of wheeled mobility devices. It also reflects a notable improvement on the existing pedestrian provision on Weller Street and also a notable improvement on the typical lack of footpath provision for similar streets in the vicinity that carry higher road user volumes (an example being Doon Street).

Proposed Weller Street gradient

62. I consider that the 16% maximum gradient as per Table 3.1R is an appropriate maximum gradient to broadly apply for this context. However I also consider that any sections with a steeper gradient should be short in length and only adopted where a shallower gradient cannot be practically achieved.

63. This maximum gradient requirement is broadly reflected in the concept design **Refer to ATTACHMENT B, Drawing C010 longsection**. The concept design has gradients steeper than 16% from CH80 to CH180, up to 19% over a 20 m length. This vertical gradient will not be suitable for casual cyclists or mobility devices, which is accepted due to the topography and limited number of dwellings. A footnote to Table 3.1R notes that for gradients steeper than 16%, "*need specific design and must be concrete*".

64. The proposed gradients will require the road to be suitably designed for concrete construction at detailed design. Appropriate road and footpath surfacing treatments will also be required so that these are trafficable in all weather, including wet and icy conditions.

65. Further, the relatively flatter area for the adjoining accessways at CH120 effectively offers a pull-over or rest points for road users, such as cyclists or pedestrians pushing a pram.

Proposed Weller Street retaining walls

66. I note that the concept design includes the extents and heights of retaining walls, indicatively shown as timber pole retaining walls. This

assumption reflects the existing retaining walls, however I also note that the geotechnical advice (Terra Managed Design and Construction, June 2021) received which "recommended any new retaining walls are designed as gabions, timber pole or timber crib retaining wall". I infer from this that there are likely to be several retaining wall options available to be considered at detailed design, with factors such as: cost, visual appearance and constructability factored in. I note any corresponding earthworks and retaining works required to accommodate the upgrades to Weller Street will be addressed by appropriately qualified geotechnical specialists.

Proposed Weller Street vehicle tracking

67. The vehicle tracking checks were summarised in the ITA section 5.5 and ITA Table 7 with comments on the outcomes. Further tracking checks were undertaken on the concept design at the reverse curves. **Refer to ITA tracking in Table 7 as ATTACHMENT C.10 and supplementary firefighting appliance tracking through the reverse curves as ATTACHMENT C.11.**

68. I note that vehicle tracking checks were completed using specialist AutoTurn software in AutoCAD in 2d for the indicative schematic design, and more tracking checks were similarly undertaken for the concept design. These checks were used to inform an appropriate intersection and road configuration, and to verify access by the types of vehicles expected to use Weller Street.

69. I understand that the existing lack of firefighting provision is proposed to be addressed, via proposed new water supply infrastructure including new water supply hydrants on Weller Street (as per the Fluent Solutions three-waters assessment, Appendix A) to provide sufficient instantaneous supply, and associated access for firefighting appliances. To ensure firefighting appliances can reach all hydrants on Weller Street or private right of ways, firefighting access along the whole length of Weller Street would be required.

70. I note the vehicle tracking assessment was therefore undertaken for the following vehicles:

(a) A 12.6 m firefighting appliance vehicle as the largest vehicle expected to require access, assuming movements only being right-in and left-out (i.e. to/from nearest station at St Kilda).

(b) A 99th percentile car (5200 mm x 1940 mm; e.g. a minivan), with a focus on the critical movements to/from the east via left in / right out.

(c) A 85th percentile car (4910 mm x 1870 mm; e.g. a large sedan), with a focus on the critical movements to/from the east via left in / right out.

(d) The clearance shown around each vehicle is 500 mm, to reflect preferred clearance to fixed obstructions.

71. For the most frequent right-in and left-out movements at Weller Street, I note that the ITA assessment indicates all vehicles checked would be able to undertake these as continuous low-speed movements. I note that larger vehicles like a firefighting appliance would use the full carriageway width as needed at the intersection and through the reverse curves (CH90 to CH130). For this context, it is typical and expected that occasional large vehicles and emergency vehicles, such as firefighting appliances, to use the full carriageway width as needed. As noted in the ITA, the U-turn movement of a firefighting appliance in the turning head shows constraints, such that the radius would need to be slightly eased and it is expected that this would be addressed at the detailed design stage.

72. For the constrained right-out movements from Weller Street, the vehicle tracking assessment indicates both the 99th percentile car and 85th percentile car can undertake this, with slight encroachment into the widened eastbound road shoulder opposite. As this shoulder is marked as a bus stop and no-stopping, this space would normally be vacant and therefore I consider that this movement would be safe, albeit awkward.

73. For the most constrained left-in movements into Weller Street, the vehicle tracking assessment indicates that although manoeuvre space is improved, both the 99th percentile car and 85th percentile car cannot safely undertake this turn without entering the opposing

Portobello Road eastbound traffic lane. I consider that such left turns manoeuvres using the eastbound lane are not safe, due to the reduced sight distance, unpredictability of the movement to following drivers, and risk that aborted turn movements may result in drivers reversing back onto Portobello Road. Instead drivers are likely to prefer to undertake the U-turns that are observed currently. While such U-turns are not ideal from a road safety perspective, I do not consider them to present a significant road safety issue in this instance. This is because they are expected to be occasional, made by familiar drivers, made from the pump station shoulder where sight distances are better. This conclusion is supported by reported 10-year crash history which does not record any crashes associated with this type of manoeuvre (or other turning movements at Weller Street).

74. I consider it to be acceptable that vehicles turning left-in at the intersection would still use both lanes of Weller Street as needed, and as they do currently. Such allowance is typical on constrained low volume roads like Weller Street, and the concept design provides more width than the existing configuration.

75. I agree with the ITA recommendation to consider the use of line-marking and hatching to highlight the tight left turn geometry from Portobello Road into Weller Street. Such line-marking may help draw driver attention to the geometry and discourage drivers from attempting a left turn as a single movement (with aborted turning attempts possibly resulting in unanticipated reversing movements towards Portobello Road). By using line-marking rather than physical obstacles like kerbing, familiar drivers can still make the tight left turn without facing a potential hazard.

76. From the outcomes of the tracking checks, the proposal enables access for firefighting appliances (with turning head radius slightly eased), enables right-out movements for cars, and would still require the existing U-turns (made as one or as two stages) instead of left-in movements for cars.

Proposed Weller Street construction activities

77. I note the specific construction approach has yet to be developed since the commentary in the ITA. As concerns about construction effects were raised by submitters I discuss the approach that will be taken to construction of a project such as this one. Obviously the detail will need to be left to the subdivision phase when detailed design and methodologies are available. The construction methodology and mitigations would typically be covered in a Construction Management Plan and Traffic Management Plan, approved by consenting and roading controlling authorities prior to works commencing.

78. I note that transport effects associated with construction activities will depend on factors such as: construction methodology, duration of works, the lateral extent of earthworks (e.g. influenced by the type of retaining wall), and the plant required to be on-site. It is expected that there will be some initial temporary works required to enable construction vehicle access and create site establishment areas, prior to the construction of the development site. These works are typically vegetation removal and the like.

79. Given that the site provides access to existing dwelling construction planning will occur in order to maintain accessibility to the greatest extent practicable. This will be done by a combination of staging and methodology.. Ideally at least one lane of traffic would be kept open for the majority of the works. For example, staging could mean widening on the hill-side to create one lane before constructing widening the seaward side. If Weller Street is required to be closed to road users at any stage, thereby preventing vehicle access for residents, this would typically be expected to be short in duration (i.e. during the working day), and may require mitigation, such as parking spaces to be reserved close-by on Portobello Road for residents. If closure is required, the construction plan should include a process for early communication and consultation with residents regarding this.

80. I consider that as part of the construction management planning, a Traffic Management Plan will likely be required for works on Weller Street where it is currently a public road and for works above Portobello Road (even for path or shoulder closures). It is expected that retaining

wall construction works would have some implications on Portobello Road traffic. Major plant and heavy vehicle movements are expected to gain site access to/from the west, with turning opportunities provided within the site.

81. In my opinion construction will be able to be undertaken in a manner that adequately mitigates effects on residents and that typical methods will be appropriate for the site.

Proposed Weller Street further design aspects

82. I consider that the ITA and concept design are sufficient to assess the expected transport effects of the proposal. Notwithstanding, I expect that the detailed design phase will provide further detail regarding the following:

(a) Confirmation of waste collection operations. If a road design similar to the concept design is adopted it will be possible for waste collection vehicles to access Weller Street (as those vehicles are smaller than a firefighting appliance) Therefore, there would be an opportunity for waste collection to occur on Weller Street to reduce reliance on the existing communal collection point at the pump station area and reduce residents needing to convey wheelie bins to/from that location.

(b) Proposed signage and line-marking. I note the ITA recommendation for ‘Concealed exit’ permanent warning signage (PW-26) on Portobello Road and line-marking at the intersection.

(c) Retaining wall extents and construction. It is expected that the detailed design would refine the heights and locations of the retaining walls which have been indicatively shown as timber pole walls. Further, the inclusion of roadside safety barriers indicatively shown as w-beam barriers would be confirmed. Timber sight rails or fencing may be necessary for defining the edge of banks or for pedestrian safety alongside the footpaths.

(d) Accessway configuration and drainage features. It is expected that the detailed design would include drainage features to

capture stormwater run-off along Weller Street, and discharge at Portobello Road. Stormwater management was discussed in the Fluent Report and there does not appear to be any reasons that this cannot be addressed.

(e) Road surfacing and pavement. It is expected that the detailed design would identify the pavement surfacing and structure for the carriageway and footpath, and extent of works for access tie-ins.

(f) Street lighting along Weller Street. It is expected that the detailed design would consider if new streetlighting was required, noting the removal of the single flag light at CH120.

(g) Underground services along Weller Street. It is expected that the detailed design would identify potential underground service trench/es and access chambers, and consider interface with retaining structures and carriageway pavement, with input from service owners.

(h) Layovers for visitor parking or pull-over bays. It is expected that the detailed design would consider opportunities for widened areas to accommodate visitor parking, residents' bins / mailboxes, delivery, or maintenance.

(i) An independent road safety audit may be required for detailed design.

RESPONSE TO TRANSPORTATION MATTERS OF CONCERN RAISED IN SUBMISSIONS

83. Regarding the concern of the Weller Street / Portobello Road intersection having its "current under-performance further exacerbated", I consider that the estimated peak hour future trip generation is so low that it would be negligible in terms of volumes and adverse efficiency effects even with the existing layout. I consider that the proposal would result in substantial safety and access improvements to the intersection configuration, notwithstanding allowances having been made for existing built constraints. Overall, I consider these transport improvements will benefit existing residents.

84. Regarding the concern of the capital costs to undertake the Weller Street and Weller Street / Portobello Road intersection improvements, I understand these costs would be borne wholly or partly by the developer and that any cost sharing would be agreed as part of the resource consenting process in discussion with Council. I believe there are also likely to be lower maintenance costs and better level of service associated with new road, retaining and stormwater assets. Without the proposal proceeding, it is possible that Weller Street could remain in its current condition for some time unless there is substantial improvement by Council, such that proposed improvements covered by private development (wholly or partly) may present a cost-saving opportunity for Council.

85. Ongoing maintenance arrangements will be determined by the land tenure (noting that Weller Street currently terminates approximately 90 m from the Portobello Road intersection meaning that land beyond that point is the responsibility of the landowners.

86. Regarding the concern of the proximity to existing retaining walls and width constraints, the concept design has made allowance for these, as reflected in the proposed cross-section and one-way constriction. The design shows:

    (a) At CH160, an at-grade tie-in past the existing dwelling at number 338 (built to the cadastral boundary) to avoid height difference along the boundary.

    (b) At CH30, the proposed road surface constructed 1.9 m above the existing surface, to tie-into at the garage built over the cadastral boundary for number 333, and the retaining wall there could either be replaced or encapsulated, with new retaining wall from CH40 onwards.

    (c) At CH25, the adjacent access (for number 330, 332 and 333) is proposed to be reconfigured to have access via Weller Street, to enable a wider intersection that is more legible, benefiting all users. Weller Street would be lifted 2.0 m at this location to achieve this tie-in.

87. Regarding the concern of instability of slope, stormwater run-off across road and down slope faces, erosion of embankment faces, and need to upgrade culverts, I cannot personally advise on stormwater specifics. I note that the concept design does include stormwater provision by way of consistent one-way crossfall for the road and path into new kerb & channel along the length of Weller Street, which would typically be installed with appropriately sized and located sumps and pipe infrastructure to divert run-off underground for eventual discharge. On this basis, there would be a substantial improvement in the effects of stormwater on the road.

88. Regarding the concern of existing gum trees being removed, these would be removed where required to accommodate the proposed road improvements. I cannot personally advise on vegetation specifics. I note that from a transport safety point of view, removing the trees would be beneficial in that there would be less debris on the road surface.

MATTERS RAISED IN THE SECTION 42A REPORT

89. Regarding the Council feedback outlined to date, it is noted that this is consistent across the Section 32 Report section 20.4.13 '336 & 336A Portobello Road, The Cove (GF14)', Section 32 Report Appendix 6.12 'Rezoning Assessment Sheet - 336 and 336A Portobello Road (GF14)', and Hearing 4 Greenfield zoning - Council evidence Appendix D.4 'Evidence on Transport'. The latest and most detailed Council feedback is outlined in the Section 42A Report, section 5.2.15, 'Transport', to which the following points are made in response:

    (a) The concept design presented has been developed and reviewed by experienced and suitability qualified transport professionals. The design addresses the current substandard state of Weller Street and the Weller Street intersection, with regard to carriageway widening and achieving two-way movements at the intersection, although achieving a 90 degree intersection angle was not feasible.

    (b) Following the ITA, the concept design process investigated potential options for roading upgrades with reference to the

Dunedin Code of Subdivision and Development (2010). While the concept design does not meet these standards in full in the first instance, due pragmatic consideration was applied to: the existing built constraints; tie-into existing private accesses; footpath provision; one-way constriction; and gradient. The Austroads Guide to Road Design Part 4A was applied for sight distance assessment at the intersection. Vehicle tracking checks were undertaken (for 85th and 99th percentile cars and firefighting appliances, being more conservative than waste collection vehicles), construction effects on transport, and further design aspects. Overall, completing the reconstruction and upgrade works contained in the concept design would result in a significantly improved transport outcome for existing and future residents.

(c) I note that the Section 42A Report, section 5.2.15 acknowledges that Council has not assessed (or given feedback upon) additional evidence relating to GF14 provided Council in June 2022 by the applicant. This evidence included the ITA and concept design undertaken to determine what works would be feasible, which I have outlined in this evidence for the purposes of responding to transport matters raised by Council.

SUMMARY OF EXPECTED EFFECTS AND MITIGATION

90. As part of recent upgrades for the Peninsula Connection project, the site is well located to the shared path on the seaward side of Portobello Road. This access would support walking / cycling trips, for recreation, commuting, and access to public transport via the nearby bus stops. The existing bus stop pair on Portobello Road at Weller Street are serviced by route 18, providing connectivity to Dunedin and Portobello village.

91. The reported 10 year crash history does not include any crashes attributed to Weller Street. While there have been no crashes associated with the U-turns to enter / exit Weller Street from the east on Portobello Road, I consider that this may partly reflect the low frequency of such movements by familiar drivers, and that some

drivers undertake the movement in two stages (using the eastbound shoulder).

92. I note that the ITA estimates the AM and PM peak hour vehicle trip generation for the existing 11 dwellings and nine new dwellings, showing 18 movements in the AM peak and 11 movements in the PM peak. Therefore, the current and expected future peak hour vehicle movements on Weller Street are considered to be minimal and would result in less than minor adverse capacity effects on the road network.

93. I note that the concept design (February 2022) proposes significant physical works to reconstruct and extend Weller Street, between the Portobello Road / Weller Street intersection and the subject site. The proposed reconstruction provides an opportunity to implement significant transport improvements to mitigate the existing transport constraints. The angle of Weller Street onto Portobello Road would be improved from approximately 10 degrees to 20 degrees. Whilst this angle is more acute than the 90 degrees preferred by the Dunedin Code, based on the site constraints and low traffic volumes I conclude it is an appropriate solution for the site. Combined with other changes to the intersection this still results in a improved transport outcome when compared to the existing layout.

94. Reconfiguration of the private access located immediately west (above) Weller Street to a single intersection on Portobello Road will: increase available width for the intersection; improve the legibility of the Weller Street intersection; allow for nearly flat manoeuvring area for two-way vehicle access over a short distance approximately 10 m; and modestly improve sight distance to / from the west past the pump station. Some drivers will probably still undertake two-stage right turns out of Weller Street, though with the proposed improvements more drivers may undertake the right-turn out as a single movement.

95. The concept design allows for tie-into existing private acessways and allows for existing built constraints, notably the garage at 333 Portobello Road, and dwellings built on the boundary at 338 and 340 Portobello Road. The concept design as presented is not reliant on the

removal or relocation of these built encroachments. I conclude that the design will provide improved safety and access for existing residents.

96. The proposed concept design extends the length of Weller street from 90 m to approximately 275 m with a turning head at the end assuming it is vested along its full length. The vertical alignment includes a 12% grade from Portobello Road to CH25, with a flatter section to CH80 and steeper gradients between CH80 to CH180 to reach natural ground level.

97. Applying particular design considerations for approval by the Council, the Dunedin Code standard '*Minor Residential (cul de sac)*' local road category was applied, achieving the minimum two-way traffic carriageway width of 6 m, plus 0.5 m width for kerb & channel and a single 1.4 m usable footpath. Through the one-way constriction from CH10 to CH60, the carriageway tapers to as narrow as 2.7 m from CH30 to CH40. There is sight distance through this narrowed section from CH60 downhill and all the way uphill, to allow drivers to negotiate this constriction. In the case of a conflict, there is sufficient length for a single car to park at the base of the intersection before CH10, and at CH60 to allow an opposing vehicle to pass. The estimated statistical frequency of opposing movements for this on-way section would suggest a conflict occurrence to be very rare.

98. I consider that the topographical constraints mean that providing 2 m wide footpaths as per Table 3.1R is not practical or reflective of low volumes of pedestrians given the limited user catchment. I further consider that this path provision reflects a notable improvement on the existing pedestrian provision on Weller Street.

99. The 16% maximum gradient as per Table 3.1R is broadly reflected in the concept design, but there would be gradients steeper than 16% from CH80 to CH180, up to 19% over a 20 m length. This is considered acceptable due to the topography and limited number of dwellings. A footnote to Table 3.1R notes that for gradients steeper than 16%, "*need specific design and must be concrete"*. Appropriate road and footpath surfacing treatments will be considered at detailed design.

100. Vehicle tracking checks were completed to inform an appropriate intersection and road configuration, and to verify access by a 12.6 m firefighting appliance vehicle as the largest vehicle expected to require access. From the outcomes of the tracking checks, the proposal enables access for firefighting appliances (with turning head radius slightly eased), enables right-out movements for cars, and left-in movements would still require the existing U-turns made as one or as two stages, to avoid entering the opposing Portobello Road eastbound traffic lane.

101. I note the specific construction approach has yet to be developed since the commentary in the ITA. The construction methodology and mitigations would typically be covered in a Construction Management Plan and Traffic Management Plan, approved by consenting and roading controlling authorities prior to works commencing.

102. I expect that the detailed design phase will provide further address the following: confirmation of waste collection operations; proposed signage and line-marking; retaining wall extents and construction; accessway configuration and drainage features; road surfacing and pavement; street lighting along Weller street; underground services along Weller street; layovers for visitor parking or pull-over bays; and an independent road safety audit may be required for detailed design.

CONCLUSION

103. I conclude that the site offers mode choice by being well located close to the shared path and existing bus stops on Portobello Road. I consider that there are no notable adverse effects expected relating to safety or trip generation. The proposal provides an opportunity to implement significant transport improvements to mitigate the existing transport constraints at the Weller Street intersection on Portobello Road. The concept design as presented allows for but is not reliant on the removal or relocation of these built encroachments.

104. Particular design considerations are applied for approval by the Council, where the Dunedin Code standard '*Minor Residential (cul de sac)*' local road category was unable to be fully achieved. These considerations relate to a one-way constriction, single footpath of 1.4 m

usable width, and gradient steeper than 16% in places. Left-in movements would still require the existing U-turns made as one or as two stages, to avoid entering the opposing Portobello Road eastbound traffic lane. I expect that the detailed design phase will provide further detail.

105. I conclude that the design will provide improved safety and access for existing residents and is an appropriate solution for the proposed location. In my opinion the transport safety matters associated with rezoning GF14 can be addressed such that there will be an improved outcome for the roading network and existing residents relative to the existing circumstances.

Dated 5 August 2022

Grace Elizabeth Ryan

ATTACHMENT A INTEGRATED TRANSPORT ASSESSMENT (GHD, December 2021)

ATTACHMENT B CONCEPT DESIGN AND CONCEPT DESIGN TECHNICAL MEMORANDUM (GHD, February 2022)

ATTACHMENT C FIGURES FOR EVIDENCE

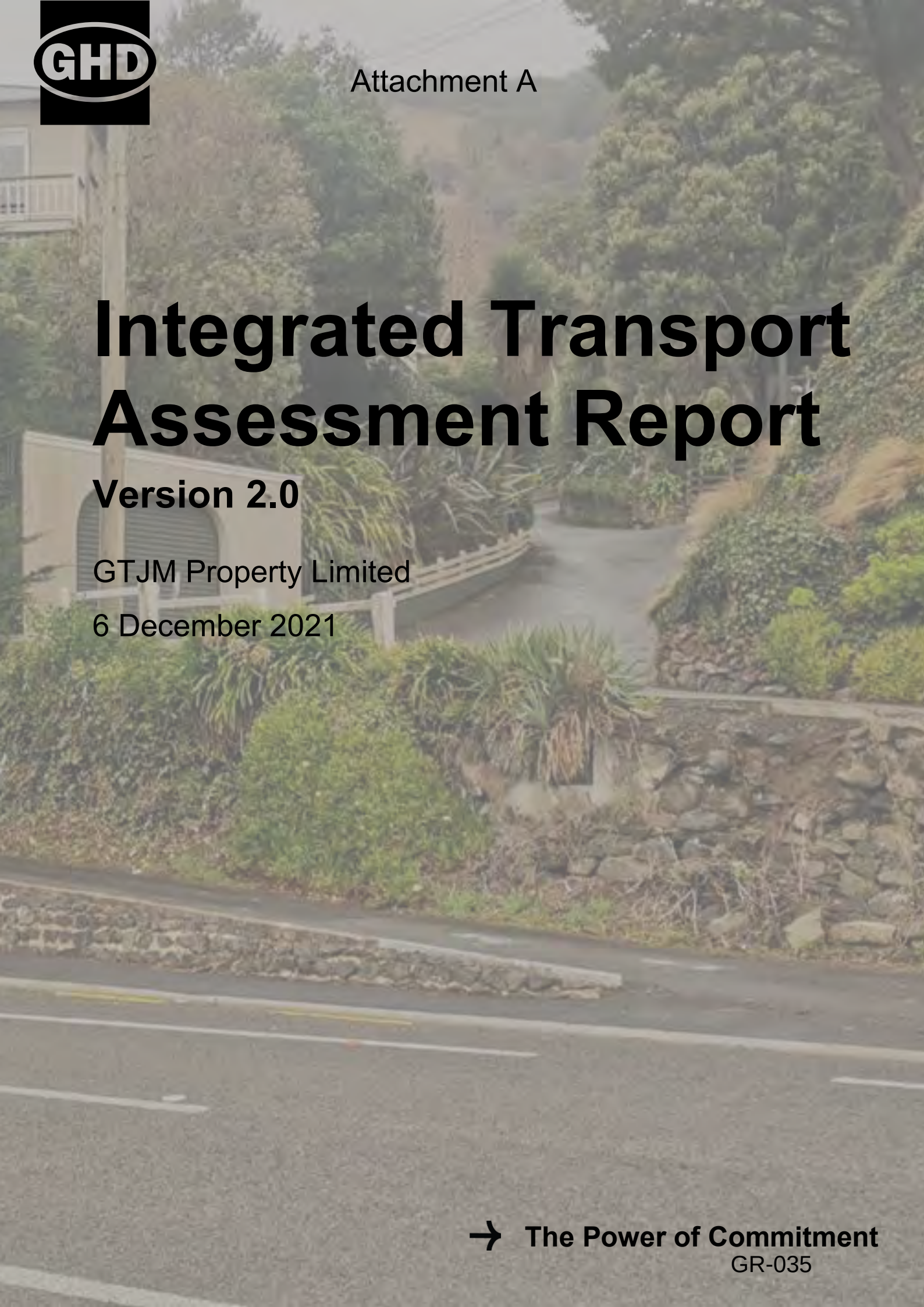
Attachment A

Integrated Transport Assessment Report

Version 2.0

GTJM Property Limited

6 December 2021



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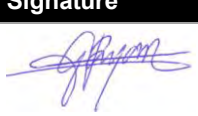
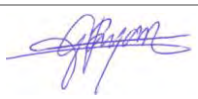
S4	01	Christina Johansson	Grace Ryan		David Mallett		
S4	02	Christina Johansson	Grace Ryan		David Mallett		2021/12/06

Contents

Table index

Figure index

Appendices

1. Introduction

1.1 Context

GHD has been commissioned by GTJM Property Limited (client) to undertake an integrated transport assessment (ITA) for the proposed development of 336 Portobello Street, Dunedin, in support of the proposed Variation 2 of the Second Generation District Plan (2GP), prepared by Dunedin City Council (DCC).

It is understood that the subject site forms part of the area being considered by DCC for rezoning to 'township and settlement' residential land, and should the rezoning be approved, the client intends to develop the land into 12 lots, including:

– Residential Lots 1 – 9
– Balance Lot 10
– Shared Access Lots 11 and 12.

As such, the purpose of this assessment is to investigate and assess the potential transport impacts associated with the proposed residential development.

1.2 Background

GHD was previously involved with Peninsula Road project, which comprised the construction of a shared path and road widening along Portobello Road, past the intersection with Weller Street. As such, this knowledge will be applied to the site context and area, including pedestrian and cycle crossing demand to the new shared path.

The current District Plan, referred to as the Second Generation Dunedin City District Plan (2GP), took legal effect on 7 November 2018. Dunedin City Council (DCC) are updating the 2GP referred to as Variation 2, in order to identify suitable greenfield areas for residential development. It is understood that the subject site is receptive to the potential future development, as a result of the Variation 2 outcomes. As such, this site forms part of the area being considered by DCC for rezoning to residential land (township and settlement zone).

In response to the 2GP Variation 2, the client requested high level transport planning advice in regard to the development of the subject site. As such, GHD provided initial planning guidance (letter dated 31 August 2020) to assist the client in understanding any transport-related concerns and risks associated with the current access arrangements to achieve alignment with the District Plan requirements. This initial planning guidance has been referenced and incorporated into this ITA report.

Following GHD advice, the client prepared a submission on the 'Dunedin City Council's Proposed Variation 2 of the Second Generation District Plan', in support of the potential residential rezoning for the subject site. This submission can be found at Appendix A.

The initial submission period for the 2GP Variation 2 closed on 4 March 2021, and the further submission period, against the 2GP Variation 2 initial submissions, closed on 17 June 2021.

1.3 Stakeholder Submissions

DCC has publicly released the first round of submissions (which closed on 4 March 2021) for the 2GP Variation 2, which included 8 submissions specifically relating to the rezoning of the subject site. Based on the addresses provided for each submitter, it can be seen that these specific submissions were received from residents who gain access via Weller Street and the adjacent private driveway.

These submissions have been quoted at Appendix B, including the submitter number and description of the submission. The concerns raised by the submitters can be categorised into various engineering aspects including geotechnical, wastewater and runoff, environment, and transport.

Therefore, with a focus on the transport-related items, the key points have been quoted below.

- *The road network into Dunedin that Portobello Rd connects to will have its "current under-performance further exacerbated" (appendix 6.12). Weller St will also have its current inadequacy (width, surface, single lane) further exacerbated if development occurs as a result of rezoning .*
- *A "feasible capacity of 5 dwellings" (appendix 6.12) neither specifies nor limits what a developer may later apply to implement. Any number at all will proportionally increase all 5 of the issues already referred to above, already experienced by existing residents*
- *Weller Street is presently unmaintained. In it's current form its single lane access onto busy Portobello Road is already at capacity servicing 7 dwellings. Any redevelopment of this "street" to allow for two way access onto Portobello Road will have significant fiscal ramifications for Council and any other interested roading authority. We are not convinced that Council is actually aware of the physical limitations of access.*
- *Weller St will also have its current inadequacy (width, surface, single lane) further exacerbated if development occurs as a result of rezoning. The appendix 6.12 does not address issues including Weller St's current close proximity to houses (at No.338), to retaining walls (at No.333), to a neighbouring shared driveway (to No.330, 332 and 333) and to the gum trees at the bottom end of Weller St (which are valued by the community both as character landmarks and as stabilisers of the bank down to Portobello Rd).*
- *– The "feasible capacity of 5 dwellings" is neither specified nor limited, and the effects above will expand with the number of dwellings.*

With consideration of the above, this assessment aims to address the concerns raised by the submitters through mitigation measures and potential upgrades on Weller Street and Portobello Road / Weller Street intersection.

1.4 Limitations

This report has been prepared by GHD for GTJM Property Limited and may only be used and relied on by GTJM Property Limited for the purpose agreed between GHD and GTJM Property Limited as set out in section 1.1 of this report. GHD otherwise disclaims responsibility to any person other than GTJM Property Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report. The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report). GHD disclaims liability arising from any of the assumptions being incorrect.

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2. Existing Environment

2.1 Site Context

The subject site is located at 336 Portobello Road, The Cove, Dunedin. Figure 1 illustrates the site location, which gains access from Weller Street via the intersection with Portobello Road. The site is currently zoned as *Rural Residential 2*, and bound by residential dwellings to the north, and rural residential land to the east and west.

Weller Street is classed as a 'Local' road (in accordance with DCC Road Classification Hierarchy), with a narrow, one-lane, two-way cross section, with a steep gradient upward from Portobello Road. It is a no-through road that provides access to eight (8) existing residential dwellings. In accordance with MobileRoad, Weller Street has an Average Annual Daily Traffic (AADT) of 20 vehicles per day (vpd) (date recorded 1 June 2020). On the basis of this, Weller Street is considered to correspond to a 'Minor Residential (cul de sac)', as described in Table 3.1R of the DCC Code of Subdivision and Development 2010 (DCC Code)[1].

There is a private driveway located immediately west of Weller Street, which provides access to three (3) existing residential dwellings. This driveway has been included in discussions and assessments in this report, given its close proximity and operational interaction with the Portobello Road / Weller Street intersection.

Portobello Road is classed as an 'Arterial' road (in accordance with DCC Road Classification Hierarchy), with a two-way, two-lane cross section, which provides access between Dunedin and the Cove. In accordance with MobileRoad, Portobello Road has an AADT of 5,400 vpd (date recorded 28 January 2019).

Figure 1 Site Location

[1] Dunedin Code of Subdivision and Development 2010. https://www.dunedin.govt.nz/__data/assets/pdf_file/0019/153163/CP-Dunedin-Code-of-Subdivision-Aug-2010.pdf

2.2 Site Access Arrangement

The site gains access via the three-way priority-controlled intersection of Portobello Road and Weller Street, as shown in Figure 2.

Figure 2 Portobello Road / Weller Street intersection

As previously mentioned, the adjacent private driveway has been included in discussions and assessments in this report, given its close proximity and operational interaction with the Portobello Road / Weller Street intersection.

Due to lack of confidence in the MobileRoad AADT estimate for Weller Street, in order to gain a stronger understanding of the traffic movements at this location, GHD completed a site visit on Tuesday 15 June 2021, to investigate the following site characteristics

- Recorded turning movements in/out of Weller Street during AM and PM peak hour
- Manoeuvrability and accessibility
- Sight distance
- Weller Street cross section
- Elevation constraints

2.2.1 Manoeuvrability and accessibility

Weller Street connects into Portobello Road at a very sharp angle of approximately 10 degrees, which aligns with the dominant movements made i.e. to/from Dunedin, at this intersection.

Though few movements were observed travelling to/from Weller Street towards the east. These vehicles were observed performing U-turns, using the area in front of the pump station and the bus stop, as shown on Figure 3. In other instances, vehicles were also observed crossing into the opposing lane to complete the turning manoeuvre into Weller Street.

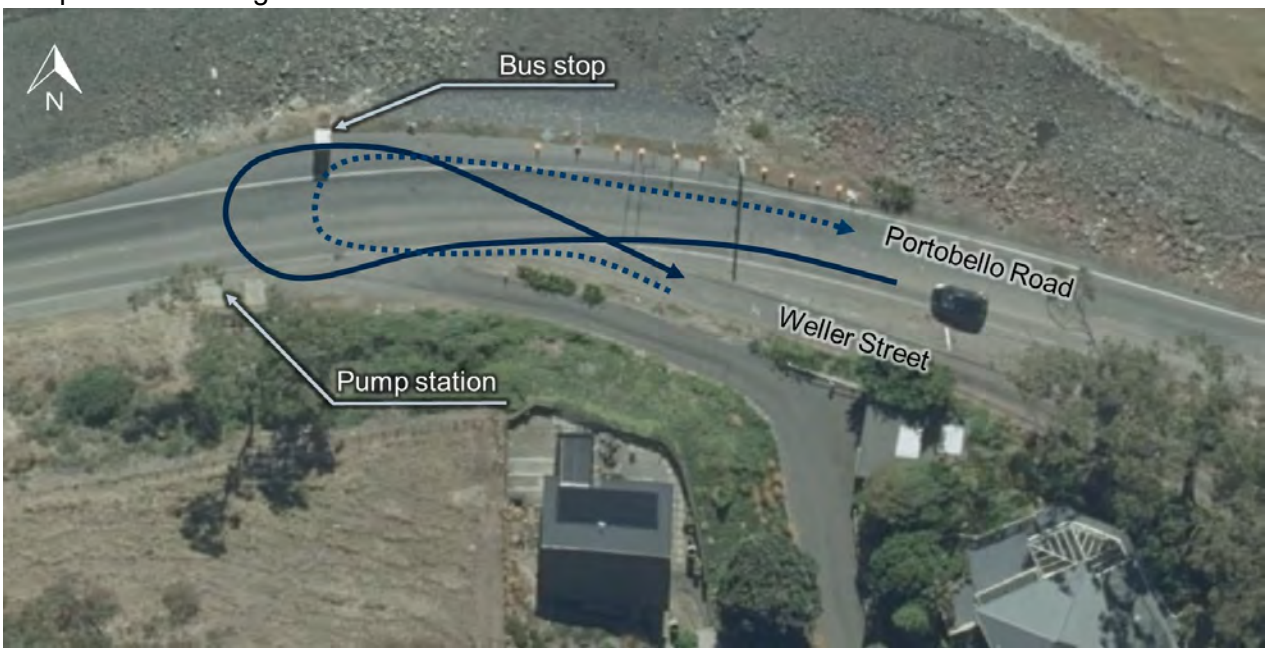


Figure 3 Vehicles performing U-turns to access Weller Street to/from the east

While the intersection allows for turning movements, the road width of Weller Street provides a lack of access for waste collection and delivery, emergency vehicles and heavy vehicles. While it was observed that rubbish collection and mail deliveries occur on Portobello Road (as shown on Figure 4), emergency vehicles are unable to access Weller Street which is a significant safety concern.

Figure 4 Communal rubbish collection point and mailboxes on Portobello Road

2.2.2 Weller Street cross section

Weller Street is very constrained due to its narrow sealed width of approximately 3 m, with retaining walls and vegetation on both sides as shown in Figure 5. This width limits efficient operation to one-way traffic, with no passing opportunities until the road splits into two private driveways at the end. There is no provision for pedestrians and cyclists. The existing pavement condition is considered to be very poor, with rutting / ravelling along the centre as shown in Figure 5, and the road has a steep gradient approximately 8% upward from Portobello Road.

As shown in Figure 6, the road widens up and splits into two private driveways, with a street lamp located in between. The left lane provides private access to eight existing dwellings, and the right lane provides private access to one existing dwelling and the proposed site. Each laneway has poor pavement condition with potholes and rutting/ravelling along the centre, and steep uphill gradients.

As shown in Figure 7, the gradient continues upward along the private driveways, and the elevation differences between the two laneways create significant constraints for potential road works.

Figure 5 Weller Street existing conditions

Figure 6 Weller Street passing opportunity

Figure 7 Private laneways turn off from Weller Street

2.3 Sight distance

2.3.1 General comments

With a relatively straight alignment on Portobello Road east, westbound traffic is considered to have adequate visibility of a vehicle stopped on Weller Street. However, vehicles on Weller Street would be slightly obscured behind the adjacent driveway and bend in Portobello Road, therefore eastbound traffic has poor visibility of vehicles waiting to turn from Weller Street.

Drivers stopped on Weller Street have a degree of sight distance for oncoming vehicles from Portobello Road west (Figure 8), however this would be reduced with consideration of driver eye height.

The position of the vehicle restricts drivers from having a clear line of sight for oncoming vehicles from the east. Due to the alignment of Weller Street, exiting drivers would have to rely on their side view mirror to see westbound vehicles coming from behind them on Portobello Road. This is not considered to be a safe arrangement.

Figure 8 Sight distance oncoming vehicles from Portobello Road west

2.3.2 Sight distance standards

In accordance with Austroads Guide to Road Design Part 4A, GHD has investigated the minimum sight distance requirements for the Portobello Road / Weller Street intersection, including:

– Approach Sight Distance (ASD)
– Safe Intersection Sight Distance (SISD)
– Minimum Gap Sight Distance (MGSD)
– Crossing Sight Distance (CSD)

The following characteristics have been adopted:

– 60 km/h design and 85th percentile speed on Portobello Road (assumed to be 10 km/h above posted speed limit of 50 km/h)
– 20 km/h assumed speed on Weller Street
– Estimated 8% downhill gradient (towards Portobello Road) on Weller Street
– 2 second driver reaction time

2.3.3 Approach Sight Distance

The ASD is described as the minimum sight distance which must be available on Weller Street to ensure that drivers are aware of the presence of the intersection with Portobello Road. For a downhill approach speed on Weller Street 40 km/h (although likely to be 30 km/h or less), an ASD of 40 m applies. This is considered not likely to be achieved. However the intersection with Portobello Road is considered to be obvious, there is high driver alertness and slower speed. Further, given Weller Street is a no-exit road and relatively private in nature, the majority of drivers are considered to be very familiar with the intersection arrangement as either residents or their visitors, such that the ASD is considered to be less critical.

2.3.4 Safe Intersection Sight Distance

The SISD is described as the minimum distance required for a driver of a vehicle on the major road to observe a vehicle on the minor road, and decelerate to stop to avoid a potential collision. Based on a design speed of 60 km/h on Portobello Road, a minimum SISD of 123 m is required (measured along the centreline of Portobello Road) for approaching drivers to see a vehicle on Weller Street. This is currently not achieved for westbound drivers, such that it extends past the pump station and adjacent access with an obstructed view. There is a minor localised obstruction for the eastbound drivers. Both sightlines are shown in Figure 9.

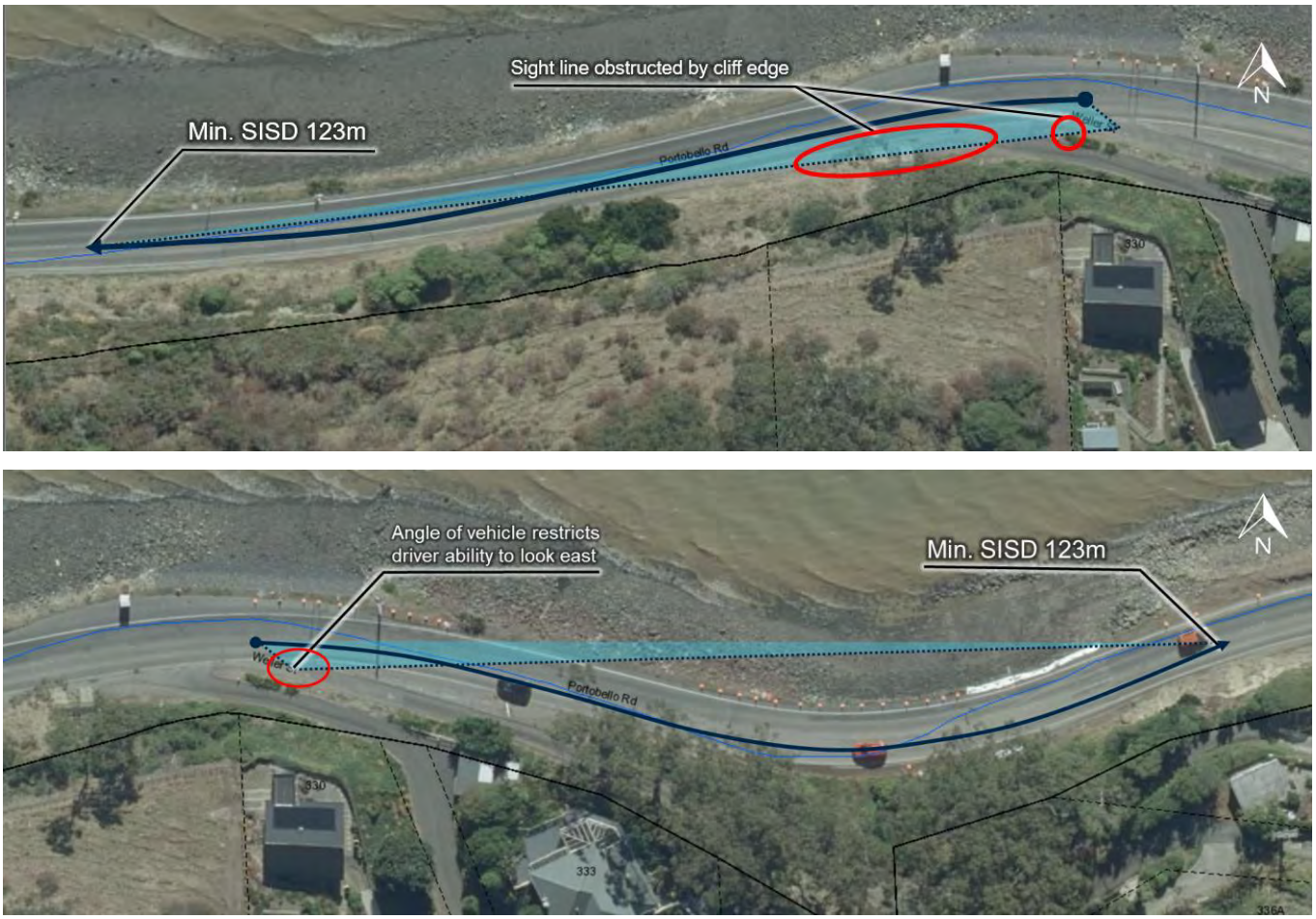


Figure 9 Safe Intersection Sight Distance on Portobello Road from the east and west

2.3.5 Minimum Gap Sight Distance

The MGSD is described by the distances associated with the critical acceptance gap that drivers are prepared to accept when undertaking a crossing or turning movement at intersections. As such, MGSD is applicable for the following turning movements at the Portobello Road / Weller Street intersection:

– 83 m for left turns to/from Weller Street (5 second critical gap acceptance).
– 83 m for right turns from Weller Street to Portobello Road (5 second critical gap acceptance for two lane/two way). This is currently not achieved.
– 67 m for right turns from Portobello Road to Weller Street (4 second critical gap acceptance across on lane). This is currently achieved, but the angle of the approach means drivers must rely on use of side mirrors.

The MGSD assumes that the above turning movements are completed in one movement, however based on the site observations, vehicles currently cannot complete right and left turns from/to Weller Street to Portobello Road (east) in one movement, and are required to undertake a two-stage movement. Therefore, the MGSD is not considered to be fully applicable for these movements.

2.3.6 Crossing Sight Distance

The crossing sight distance (CSD) is described as the distance provided between approaching vehicles and the pedestrians waiting to cross Portobello Road. Based on an 85th percentile speed of 60 km/h and a crossing distance of 8 m (6 m carriageway plus shoulder), the minimum CSD requirement is 111 m.

The CSD (looking east and west) is achieved for pedestrians crossing north to south, and also achieved for pedestrians crossing south to north (looking east). However, the sight line may be obstructed for pedestrians looking west wanting to cross south to north, due to roadside obstructions (i.e. cliff edge along Portobello south side).

2.4 Recent upgrades on Portobello Road

Recent upgrades have occurred along Portobello Road in 2020 as part of the DCC Peninsula Connection project. These include upgrades within proximity to the site access intersection, as shown in Figure 10, which include:

– Shared path for pedestrians and cyclists, which runs along the seaward side of Portobello Road
– New parking area on seaward side of Portobello Road, opposite Weller Street, (behind the bus stop)
– New pump station located on the cliff side of Portobello Road, directly west of Weller Street beside the adjacent driveway (as shown in Figure 11)
– New bus stop located directly east of Weller Street, for westbound bus services to Dunedin, as shown on Figure 12

Figure 10 Portobello Road recent upgrades

Figure 11 New pump station on Portobello Road beside Weller Street

Figure 12 New westbound bus stop located east of Weller Street

2.5 Active and Public Transport Connections

As part of recent upgrades, there is a shared path (pedestrians and cyclists) located along the seaward side of Portobello Road. This is anticipated to increase the recreational and commuter walking/ cycling demand, including potential increase for public transport users to access the nearby bus stops.

As shown on Figure 13, there is an existing bus stop located on Portobello Road at Weller Street, which is serviced by the eastbound route 18 and travels from Dunedin City to Harington Point.

The nearest existing bus stop serviced by the westbound route 18 (into Dunedin City) is located at the corner of Proctors Road, approximately 850 m east of Weller Street.

It should be highlighted that as part of the recent upgrades on Portobello Road, there is a new bus stop located directly east of Weller Street, that is soon expected to service westbound public buses into Dunedin. Table 1 summarises the bus frequencies for the existing services during the weekdays and weekends.

Table 1 Existing bus services

Route 18	Nearest Bus Stop	Peak	Off Peak / Saturday
Eastbound (Dunedin City to Harington Point)	Portobello Road at Weller Street	AM: 30 minutes (7:21am – 9:21am) PM: 30 minutes (4:23pm – 6:21pm)	60 minutes
Westbound (Harington Point to Dunedin City)	Portobello Road at Proctors Road	AM: 30 minutes (8:02am – 9:59am) PM: 30 minutes (3:41pm – 5:59pm)	60 minutes

Figure 13 Nearest bus stops on Portobello Road

2.6 Crash Analysis

A review of the Police-reported crash analysis system (CAS) data was undertaken for a five-year period between 2016 and 2020, which identified that two crashes were recorded within proximity to the site location. Table 2 summarises the crash severity, and Figure 14 illustrates the locations of each crash. Between the two crashes, there is a clear trend of wet weather. The non-injury crash involved a U-turn 55 m west of Weller Street (this movement was unrelated to Weller Street i.e. the U-turn was not made due to the tight left -turn geometry).

In the 10 year crash history outside of the recent Peninsula Connection project construction period, no further crashes related to the intersection were found.

Table 2 Crash Severity

Crash ID	Year	Location	Crash Direction	Severity	
53807	2016	Portobello Road, west of Weller Street	Westbound	Non-injury	U-turn across **Environment** 70km/h, Driveway, Wet Nil **Weather** Heavy rain, Overcast
543221	2020	Portobello Road, west of Weller Street	Westbound	Minor	Cutting in or changing lane to left **Environment** 70km/h, Nil (Default), Wet Nil **Weather** Hail or Sleet, Dark

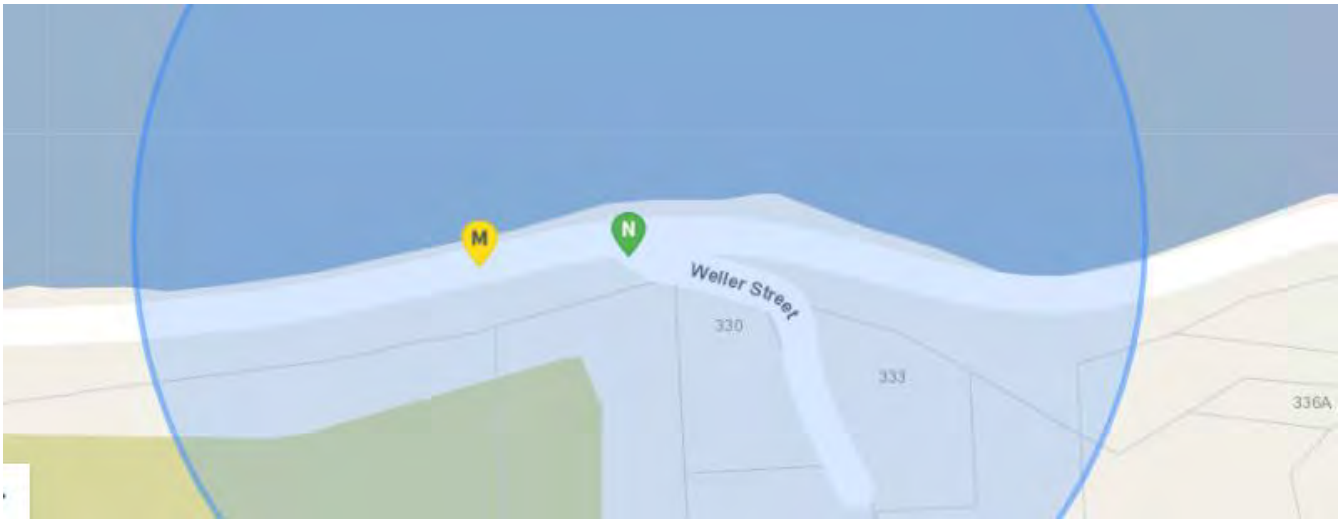


Figure 14 Crash locations

On the basis of the above, there are no crash trends associated with Weller Street and the intersection, and few crashes reported, and no death and serious injury (DSI) crashes reported.

However, based on the site visit observations, vehicles are performing u-turns to enter / exit Weller Street from the east on Portobello Road. While there have been no crashes associated with these particular U-turn movements, GHD considers this to be a safety risk as vehicles have to pullover into the bus stop and/or pump station, and cross both lanes.

2.7 Existing Trip Generation and Distribution

Due to the lack of confidence in the MobileRoad AADT estimates, to gain an understanding of the existing trip generation for the residential dwellings accessed via Weller Street and the adjacent private driveway, GHD recorded the intersection turning movements during a site visit on Tuesday 15 June 2021, for the following peak periods:

– AM peak: 7:45 am – 8:40 am
– PM peak: 4:40 pm – 5:30 pm

Table 3 summarises the observed vehicle turning movements in/out of Weller Street, including traffic to/from the adjacent private driveway. It is noted that one trip generated comprises of two vehicle movements (i.e. one movement in / one movement out).

Table 3 Observed traffic movements at Weller Street and adjacent private driveway

Peak Period	Weller Street – In			Weller Street – Out			Average peak hour trip generation
	Left In	Right In	Total In	Left out	Right Out	Total Out	
AM	0 veh	1 veh (Weller St) 1 veh (private driveway)	**2 veh (20% in)**	4 veh (Weller St) 3 veh (private driveway)	1 veh [2]	**8 veh (80% out)**	**10 veh movements**
PM	1 veh [2]	3 veh	**4 veh (67% in)**	2 veh	0 veh	**2 veh (33% out)**	**6 veh movements**

On the basis of the above, GHD has calculated the AM and PM peak hour trip generation rate for the existing 11 dwellings located on Weller Street (eight dwellings) and the private driveway (three dwellings), as follows:

– AM Peak: 10 movements per 11 dwellings equates to 0.9 movements per dwelling
– PM Peak: 6 movements per 11 dwellings equates to 0.54 movements per dwelling

Additionally, the in/out directional split and east/west distribution have been estimated from the observed turning movements. The above has been summarised in Table 4.

Table 4 Existing trip characteristics

Peak Period	Trip Generation Rate (movements / dwelling)	In/o\ut directional split	East/west distribution
AM Peak	0.9 movements / dwelling	20% in / 80% out	10% E / 90% W
PM Peak	0.54 movements / dwelling	67% in / 33% out	15% E / 85% W

[2] Vehicle performed a U-turn from Portobello Road into Weller Street.

Further observations at the site visit include the following key points:

– Vehicles utilised the clearance in front of the pump station to perform a U turn, in order to travel between Weller Street and Portobello Road east. These movements have been previously illustrated on Figure 3.
– There were two vehicles that returned within 10 minutes during the AM peak hour, therefore it has been assumed that these trips were likely a school or work drop-off nearby.
– No vehicles from the private driveway made trips during the PM peak hour.
– The AM peak was observed to be busier than the PM peak.
– The majority of traffic was travelling to/from the west towards Dunedin city centre.

On the basis of the above traffic observations, the AM and PM peak hour trips generated by the existing dwellings on Weller Street (5 trips and 3 trips respectively) are considered to be minimal, such that the intersection is considered to have sufficient capacity.

3. Proposed Environment

3.1 Development Proposal

Subject to DCC approval to rezone the subject site to 'township and settlement' residential land, the proposed development will include nine residential lots (Lots 1 – 9), two shared access lots (Lots 11 and 12), and a balance lot (Lot 10), as shown in Figure 15.

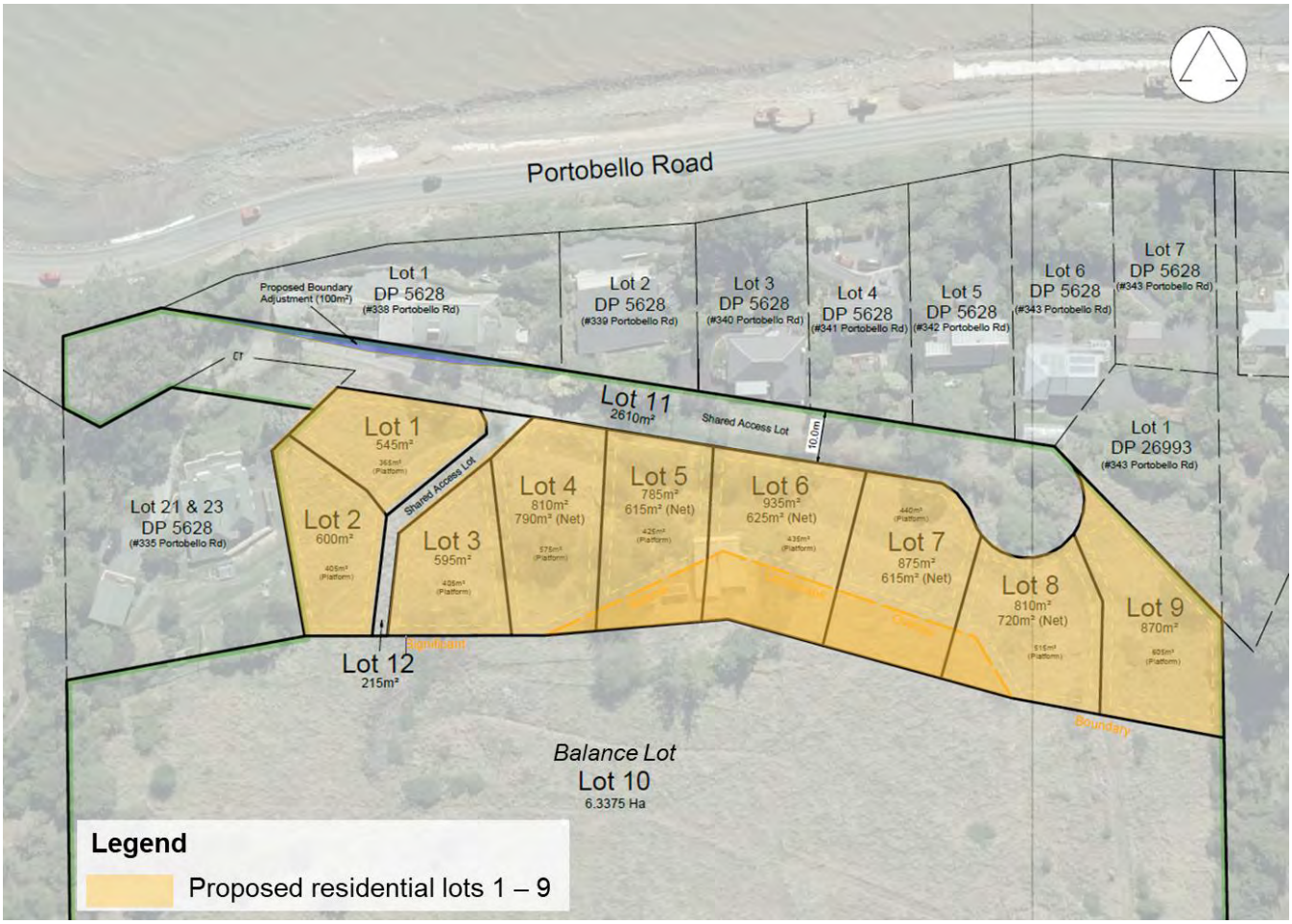


Figure 15 Proposed development (as per D12178-2-Concept-Concept Plan, prepared by Terramark)

Outside the subject site, physical works are also anticipated at the Portobello Road / Weller Street intersection and along Weller Street, in order to connect the proposed development to the existing road network. This connection is shown in the potential schematic layout in Figure 16.

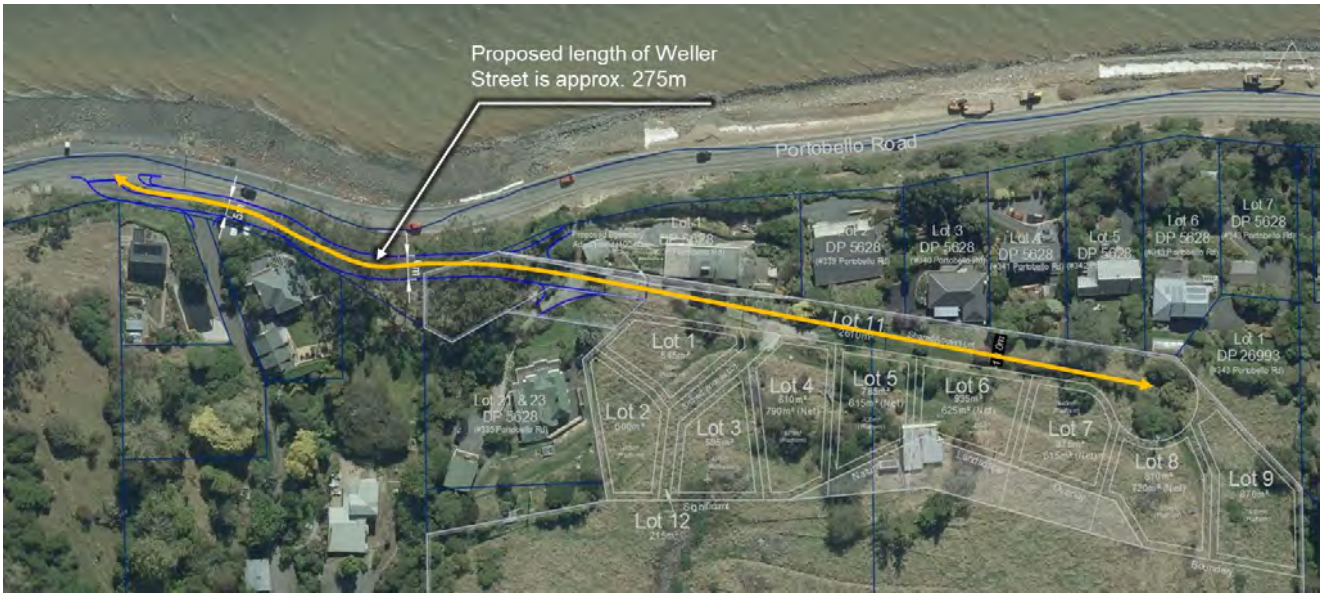


Figure 16 Schematic diagram of the Portobello Road / Weller Street intersection and Weller Street road alignment

3.2 Proposed Trip Generation

GHD has applied the existing trip characteristics, identified in Section 2.7, to the proposed development in order to estimate the increase in traffic likely to be generated by the additional nine residential lots on Weller Street. The estimated trip generation has been summarised in Table 5.

Table 5 Estimated trip generation for the proposed development

Peak Period	Proposed Lots	Trip Generation Rate	Total Peak Generation (proposed)	Total Peak Generation (existing + proposed)
AM Peak	9 lots	0.9 movements / lot	**+8 movements**	**18 movements**
PM Peak		0.54 movements / lot	**+5 movements**	**11 movements**

As shown above, the proposed development is anticipated to generate an additional 8 and 5 movements, during the AM and PM peak hour respectively. Therefore, with the inclusion of the proposed development, Weller Street (including the adjacent private driveway) will be servicing up to 20 lots (11 existing and 9 proposed) with a total of 18 and 11 movements during the AM and PM peak hours.

Compared against the current bi-directional peak volume of 540 trips (assumed to be 10% of AADT 5400 vpd) on Portobello Road, the inclusion of the proposed development would not result in any adverse effects of significance due to the volume change of 2 – 3% during the AM and PM peak respectively.

As such, the proportional impact of the proposed development is expected to have a less than minor impact on Portobello Road.

Furthermore, in accordance with the 2GP Variation 2 – Additional Housing Capacity Section 32 Report, GHD has considered section 20.4.13, which relates to the subject site (336 & 336A Portobello Road, The Cove). More specifically section 20.4.13.2.821 indicates the following:

The road network adjacent to the harbour, from the intersection of Marne Street / Portobello Road to approximately Strathallan Street is under performing during the morning and afternoon peak hours. While this site will contribute only a small increase in traffic additional development in the Otago Peninsula area will exacerbate this situation. A wider and local area traffic management study, and roading and intersection upgrades, may be required.

On the basis of the above, it is understood that the road network from Marne Street / Portobello Road intersection to Strathallan Street (i.e. into Dunedin central city) is currently underperforming during the AM and PM peak.

With the inclusion of 4 trips (AM peak) and 3 trips (PM peak) generated by the proposal, there is considered to be minimal impacts on the operation of the road network.

3.3 Construction Activities

Construction activities are unknown at this stage. However, it is acknowledged that there will be some temporary works required to enable construction vehicle access and establishment areas prior to the construction on the development site. Staging and sequencing considerations will help mitigate impacts on Weller Street and reduce disruption. Furthermore, a traffic management plan will be required for Portobello Road, and it is acknowledged this will be likely to have some implications on the road traffic.

4. District Plan Compliance

In accordance with the latest DCC 2GP District Plan (appeals version), Table 6 summarises the proposal compliance against the relevant transport rules. This assessment has assumed that the rezoning has occurred, such that the site is zoned as residential (township and settlement zone).

Table 6 Proposal compliance against DCC 2GP District Plan rules

Transportation Rule	Description	Proposal	Compliance / Non Compliance
6.3 Activity Status	**6.3.1 Activity status introduction** **6.3.2 Activity status of transportation activities**	The proposal is considered to involve the following transportation activity, which has an activity status of Discretionary Activity: New roads or additions or alterations to existing road	NA
6.4 Notification	The NZ Transport Agency will be considered an affected person in accordance with section 95B of the RMA where its written approval is not provided with respect to the following applications for resource consent: high trip generators on state highways; any new vehicle accesses onto state highways; and a subdivision that proposes to have access onto a state highway. With respect to resource consent applications for the following activities, Manawhenua will be considered an affected person in accordance with s95B of the RMA where their written approval is not provided: all restricted discretionary activities that list 'effect on cultural values of Manawhenua' as a matter for discretion; and discretionary and non-complying activities in a wāhi tūpuna mapped area where the activity is identified as a threat to the wāhi tūpuna mapped area in Appendix A4. All other activities are subject to the normal tests for notification in accordance with sections 95A-95G of the RMA.	The proposal does not apply to a state highway, nor is located in a wāhi tūpuna mapped area.	NA
6.5 Transport Activities Performance Standards	**6.5.1 Design and Location - Road Signs** Any road sign overhanging the footpath must, at its lowest point, be at least 2.6m above the footpath directly beneath the sign. Road signs must not obstruct the carriageway. The maximum area of road signs providing directional information is 0.25m². For road signs providing regulatory or warning information, there is no maximum area. Road signs providing directional information must not be of a design or form that resembles signs providing regulatory or warning information. Road signs providing directional information must not limit the visibility of road signs providing regulatory or warning information. Road signs must not replicate the colours or shapes used for traffic control devices.	6.5.1 is not applicable to the proposal at this stage. However, should the appropriate signage be installed (i.e. PW-26 concealed road), reference in accordance to 6.5.1 will be made. 6.5.2 will be referenced where any scheduled trees are involved.	NA

Transportation Rule	Description	Proposal	Compliance / Non Compliance
	Activities that contravene this performance standard are restricted discretionary activities. **6.5.2 Setback from Scheduled Tree** New roads or additions or alterations to existing roads where part of an approved subdivision must comply with Rule 7.5.2.		
6.6 Parking, Loading and Access	**6.6.1 Car Parking Design** 6.6.1.1 Minimum parking space dimensions 6.6.1.2 Minimum manoeuvring space dimensions for parking areas 6.6.1.3 Minimum queuing space for parking areas **6.6.2 Vehicle Loading Design** **6.6.3 Vehicle Access Location and Design** 6.6.3.1 Maximum number of vehicle crossings 6.6.3.2 Minimum sight distance from a vehicle access 6.6.3.3 Maximum width for a vehicle access 6.6.3.4 Minimum distances of new vehicle crossing from intersections and level crossings **6.6.3.5 Standard of vehicle accesses onto state highways** **6.6.3.6 Surfacing of driveways** **6.6.3.7 Gradient of driveways** **6.6.3.8 Minimum distance between driveways and dwelling** **6.6.3.9 Width of driveways** **6.6.3.10 Sightlines to level crossings**	6.6.1 is not applicable given the proposal does not include car parking design. Should any car parking be provided at a later design stage, reference and accordance to 6.6.1 will be made. 6.6.2 is not applicable given the proposal does not include designated loading areas. It has been assumed that all loading activity will occur on each private lot. 6.6.3 is applicable to the proposal as follows: 6.6.3.1 indicates a maximum of one (1) vehicle crossings permitted on each road frontage of any lot on Weller Street and the proposed new road. 6.6.3.2 only identifies sight distance requirements for speeds from 50km/h and above. Given Weller Street is proposed to be a low speed environment, the proposal will aim to maximise sight distance at each vehicle access. 6.6.3.3 indicates a maximum vehicle access width of 6m for residential activities, therefore reference and accordance will be made. 6.6.3.4 indicates a minimum distance of 30m is required on a local road between a vehicle crossing and an intersection with an arterial road, which is provided by the proposal. 6.6.3.5 is not applicable, given there are no state highways. 6.6.3.6 – 6.6.3.9 is not applicable at this stage of the proposal. 6.6.3.10 is not applicable, given there are no level crossings.	Plans are not currently at this detail. The future design will have to be cognisant of these applicable Rules.
6.7 General Performance Standards	**6.7.1 Service Station Standards** **6.7.2 Public Amenities and Signs Located on or Above the Footpath**	Rule 6.7 is not applicable.	NA

Transportation Rule	Description	Proposal	Compliance / Non Compliance
	6.7.3 Signs Visible from Roads		
6.8 Subdivision Performance Standards	6.8.1 Access Every resultant site must have a legal accessway, and where there is minimum car parking required by the Plan, this must be in the form of a driveway except if the resultant site is: an esplanade reserve; a reserve, other than an esplanade reserve, which adjoins a site in the same ownership that has a legal accessway; or the result of a road stopping process which adjoins a site in the same ownership that has a legal accessway. Activities that contravene this performance standard are restricted discretionary activities.	The proposal will include a driveway for each subdivided lot to accommodate the minimum car parking requirements, therefore reference and accordance to 6.8.1 will be made.	Plans are not currently at this detail. The future design will have to be cognisant of these applicable Rules.
6.9	6.9 Assessment of Controlled Activities (NA)	Not applicable.	NA
6.10	6.10 Assessment of Restricted Discretionary Activities (Performance Standard Contraventions)	Not applicable.	NA
6.11	6.11 Assessment of Restricted Discretionary Activities	Not appliable.	NA
6.12	6.12 Assessment of Discretionary Activities	Applicable given the proposal includes Discretionary Activity. The most relevant items are: 6.12.3, item 1: The site excludes the balance lot, which is designated as a Significant Natural Landscape (SNL) zone. 6.12.3, item 2: DCC is allowed to apply discretion in matters including: provision for all users, integration with surrounding land uses, road classification hierarchy, safe and efficient movement of cyclists, road space allocation and design, the function and appropriateness of the road design.	Schematic design already considers road form and function. Plans are under development regarding cross section. The future design will have to be cognisant of these DCC requirements.
6.13	6.13 Assessment of Non-complying Activities	Not applicable.	NA
6.14	6.14 Special Information Requirements 6.14.1 Parking demand information 6.14.2 Integrated transport assessment	6.14.1 is not applicable given the proposal is considered to provide adequate car parking for each private lot. 6.14.2 is not applicable given the proposal is not considered to be a high trip generator.	NA

5. Assessment of proposal

5.1 Risk

There are a number of risks that need to be considered in future with regard to the proposal's transport effects. Currently the design is limited to a 2D schematic layout which means at this stage there is limited knowledge with regard to what can be practically or feasibly provided. The design outcome will likely depend upon geotechnical retaining walls and landscaping solutions, and it is assumed these are able to be implemented within the space available as part of this assessment.

It is understood that there have not yet been landowner discussions on the impacts to accesses and no discussions directly with DCC, which may also identify other requirements or limitations.

5.2 Assumptions

The existing road network remains relevant as part of the proposal, therefore GHD has assessed the current conditions of the road network, encompassing the Portobello Road / Weller Street intersection and Weller Street. Additional consideration has been made to the observations from the site visit. This has informed the following statements and assumptions to be made in relation to the proposal:

- The general location of the intersection is not changing due to geographical constraints.
- Assuming the intersection will remain in its current priority-controlled T arrangement. The proposal as provided has not considered other options, and changes to the form of intersection are not considered to be warranted, although not formally investigated. The retention of existing intersection form is believed to be appropriate for the corridor and volumes.
- Layovers for passing / u-turn opportunities do not formally exist, and have been excluded from the proposal. These movements are considered to be adequately undertaken now with no evidence of safety issues.
- Any other physical works on Portobello Road have been excluded as well, such as widening for left or right turn movements from Portobello Road. This is considered to be acceptable, given few vehicles are undertaking this movement and the recent road upgrade, further improvements to Portobello Road are not considered to be feasible or pragmatic given the major works required.
- The adjacent private driveway currently creates confusion with Weller Street, therefore it is proposed to shift the driveway from Portobello Road and gain access directly from Weller Street. This will improve intersection legibility and sight distance. The proposal may be contingent on this change to create enough space at the intersection. It is understood this has not yet been discussed with the land owner or Council.
- The private driveway at the end of existing Weller Street (which services eight existing dwellings east of No. 338) is proposed to be modified such that it creates a T-intersection arrangement with existing Weller Street and the proposed new road.. There is expected to be no or minimal impact on the existing private driveway. Access via the reconstructed Weller Street is expected to improve access for these dwellings. It is understood this has not yet been discussed with the landowners or Council.
- The existing or future services have not been specifically considered, and it is assumed these are underground or will be considered within cross section requirements.

5.3 New road connection

The existing official length of Weller Street is approximately 90 m, and the proposal intends to extend the length to approximately 275 m. The road width would range from 5 m to 10 m, and opportunities for passing have yet to be identified. Refer to Figure 16 for reference.

- Standards New Zealand PAS 4509:2008 indicates a fire appliance must always be within 90 m of water supply (i.e. fire hydrant), therefore the extension of Weller Street will now require more fire hydrants to ensure a fire appliance can reach all dwellings from Weller Street or associated right of ways.

It is acknowledged that significant physical works will be required to complete the Weller Street connection between the Portobello Road / Weller Street intersection and the proposed new road (as part of the proposal), which would include retaining walls, earthworks, and landscaping. This would therefore require complete reconstruction of the existing Weller Street, and provide opportunity to implement significant mitigation measures discussed in Section 6.

With the assumptions of the above, a potential schematic layout for the alignment of Weller Street is shown in Figure 16. The width of road is nominally shown as 6 m within road reserve, and reduced to an indicative 5 m as shown, due to an existing structure. It is assumed that the new extended length of Weller Street will be vested back unto DCC, excluding private right of ways. These works relating to the road network will be discussed in more detail of Section 6.

This schematic should not be taken to represent the future road alignment, which is subject to concept design. This layout does not consider the engineering implications, such as retaining walls near or on boundaries or impacts on adjacent properties, at this stage.

5.4 Intersection sight distance

Given the relatively straight alignment of Weller Street, the intersection design should maximise the ASD as far as possible, given the site constraint, for drivers to achieve adequate visibility of the limit line at Portobello Road.

In order to satisfy the MGSD (most critical) and SISD requirements, while considering the geographical constraints at the current intersection, it is recommended to realign Weller Street towards the adjacent private driveway (which is intended to be relocated). By realigning Weller Street, there is the opportunity to improve the line of sight to / from the west such that it will extend past the pump station, providing an unobstructed view. The approach angle for the line of sight to / from the east is considered to be unlikely to be feasibly addressed, meaning exit movements are likely to still require the use of side mirrors.

Compared to the current situation, the proposal does not change the CSD achieved by pedestrians crossing Portobello Road.

5.5 Vehicle Tracking

Vehicle tracking was completed on the schematic road alignment in order to inform further mitigation measures as discussed in Section 6. GHD has undertaken vehicle tracking to inform an appropriate intersection and road design that can improve accessibility for vehicles travelling between Weller Street and Portobello Road. This tracking exercise required an indicative outline of the new Weller Street alignment and width as previously shown in Table 7.

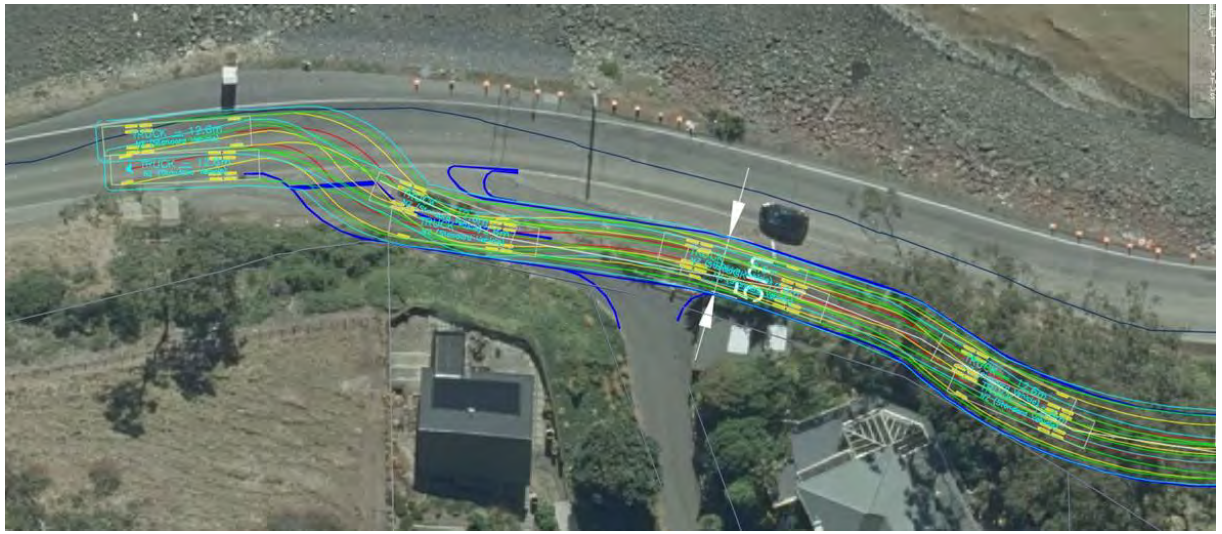
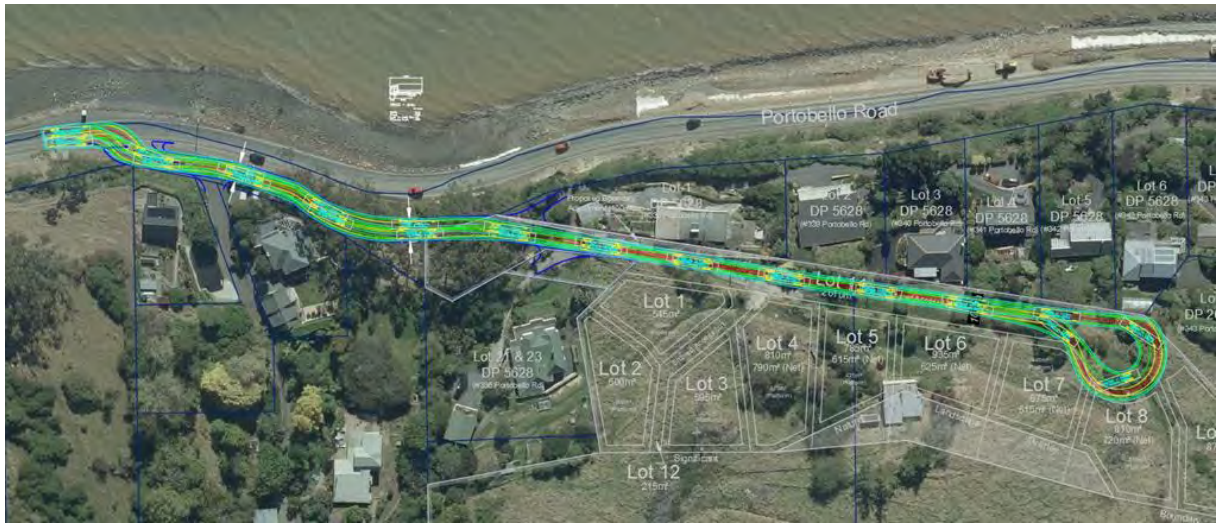
The vehicle tracking has been undertaken for the following vehicles:

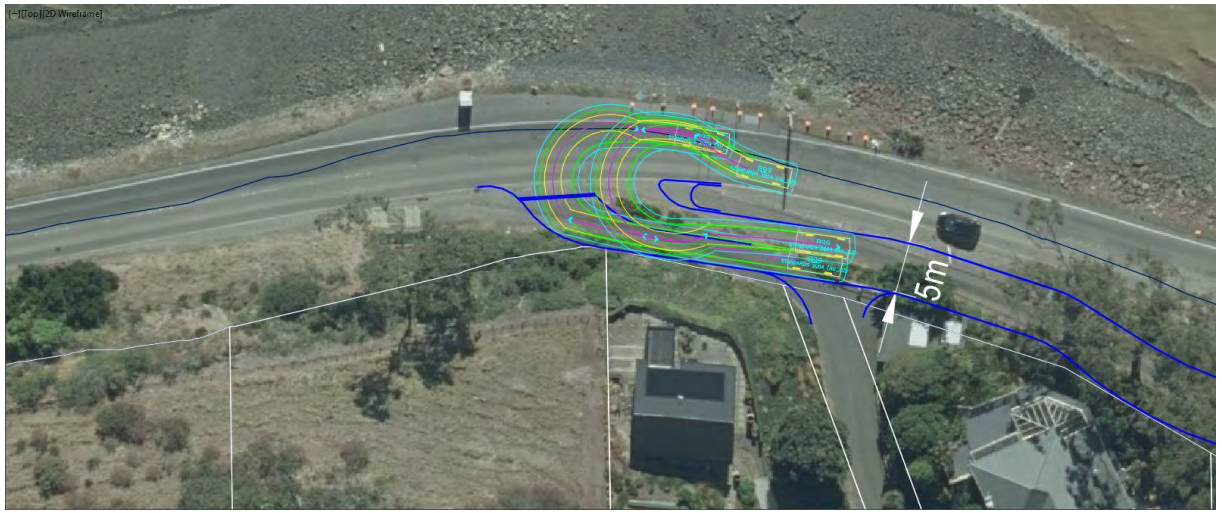
– largest design vehicle, assumed to be a 12.6 m fire appliance vehicle (design vehicle), which may be a conservative-sized vehicle and will likely access Weller Street to/from Dunedin from the west, via right in / left out movements. The clearance shown around each vehicle is 500 mm.

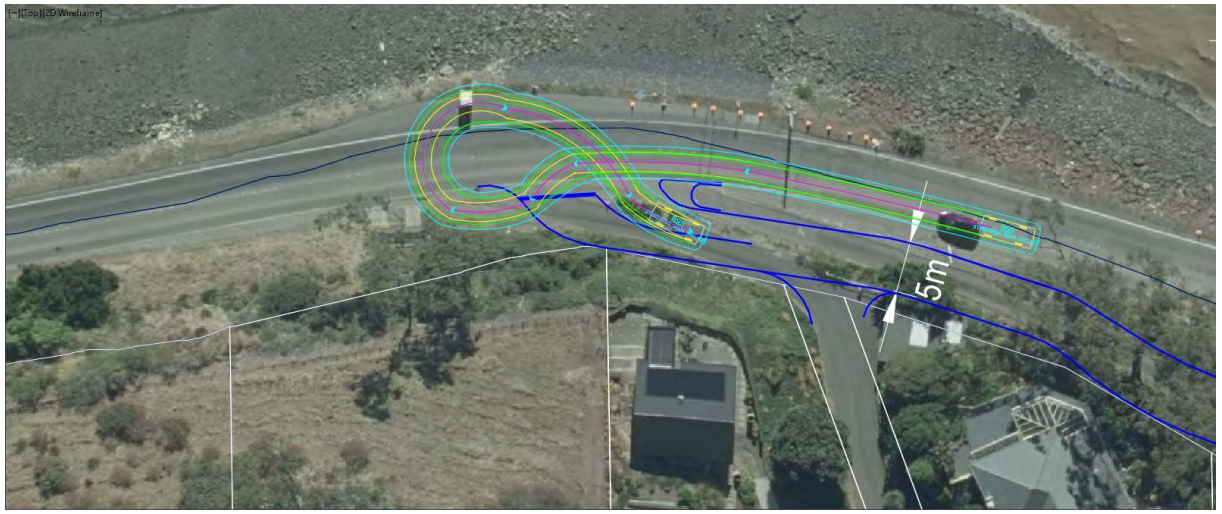
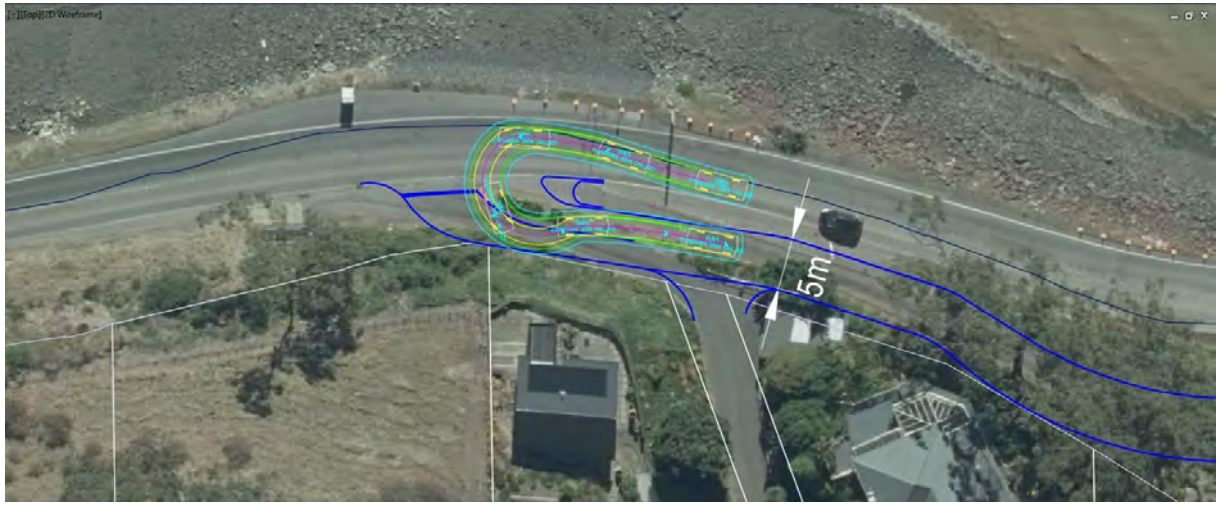
– 99th percentile vehicle (5200 mm x 1940 mm), with a focus on the critical movements to/from the east via left in / right out.
– 85th percentile vehicle (4910 mm x 1870 mm), with a focus on the critical movements to/from the east via left in / right out.

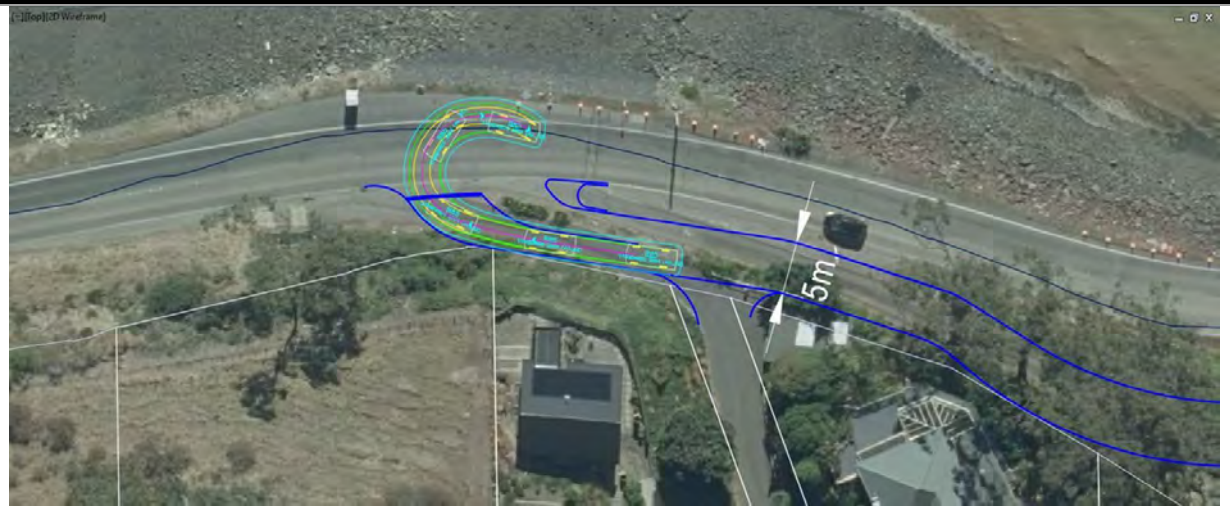
The vehicle tracking for the fire appliance has been summarised in Table 7, with comments on the outcomes.

Table 7 Vehicle tracking for fire appliance and B99 and B85 vehicles

Vehicle and Movement	Vehicle Tracking	Comments
12.6m fire appliance Right in from Portobello Road to Weller Street Left out from Weller Street to Portobello Road (west)	 	The assessment indicates that the vehicle can safely turn right in and left out of Weller Street. However, the vehicle encroaches on both lanes to access Weller Street. The width of Weller Street can safely accommodate the vehicle travelling along its length. Emergency vehicles will be expected to have full use of the road width at this time.

Vehicle and Movement	Vehicle Tracking	Comments
12.6m fire appliance U turn at cul-de-sac		The vehicle tracking indicates that a fire appliance cannot safely manoeuvre around the cul-de-sac in one movement. Therefore, it is recommended to modify the cul-de-sac to allow the fire appliance to safely turn around. This may impact indicative lot boundaries. However, it should be noted that this is considered to be a conservative representation of the tracking.
B99 passenger vehicle Right out from Weller Street to Portobello Road (east) Left in to Weller Street from Portobello Road (east)		The assessment indicates that the vehicle can safely turn right from Weller Street to Portobello Road (east), with the clearance slightly encroaching across the edge line on the northern side. This is considered to be acceptable, as it was observed that there are few vehicles performing this movement. A vehicle cannot safely turn left from Portobello Road (east) into Weller Street, as it requires the vehicle to undertake a u-turn while encroaching into the opposing traffic lane, which is considered a high risk manoeuvre.

Vehicle and Movement	Vehicle Tracking	Comments
B99 passenger vehicle U-turn from Portobello Road (east) into Weller STreert via pump station and bus stop		Additional B99 vehicle tracking was undertaken to demonstrate the current u-turn movement that vehicles are performing to access Weller Street from Portobello Road (east). The B99 vehicle pulls over beside the pump station, crosses two traffic lanes into the bus stop, and loops into Weller Street. This u-turn is shown with the left turns in (using both lanes on Portobello Road) and the right turns out (very limited clearance).
B85 passenger vehicle Right out from Weller Street to Portobello Road (east) Left in to Weller Street from Portobello Road (east)		The vehicle tracking for the B85 vehicle has been illustrated on Figure 15. The assessment indicated that the vehicle can safely turn right from Weller Street to Portobello Road, similarly as the B99 vehicle, with the clearance slightly encroaching across the edge line on the northern side. This is considered to be safe, as it was observed that there are few vehicles performing this movement. The B85 vehicle encountered similar issues as the B99 vehicle, and it cannot safely turn left from Portobello Road to Weller Street. The vehicle still encroaches into the opposing traffic lane, which is not considered to be safe nor acceptable. However the

Vehicle and Movement	Vehicle Tracking	Comments
		existing manoeuvre space is improved. Instead the u-turns undertaken currently are preferable to the tight left turns, which may result in drivers making reverse movements back onto Portobello Road. The u-turns are considered to be occasional, at low speed, with drivers familiar to indicating before braking, and with low crash risk as evidenced in the 10 year crash history. Exit / entry conflicts would be rare, anticipated, and mitigated by the wider intersection space.

6. Mitigation Measures

GHD has investigated the potential mitigation measures that could be implemented at the Portobello Road / Weller Street intersection and Weller Street, in order to improve the existing and proposed potential safety concerns, as identified by our assessment of the proposal.

6.1 Intersection Upgrades

As previously mentioned, the intersection will remain in its current priority-controlled T arrangement, in a similar location as the existing configuration. Minimal works are anticipated on Portobello Road, which will maintain its existing two lanes (no right turn bay), within the proximity of the intersection.

The proposal incorporates local widening and realignment of the Weller Street approach to improve manoeuvrability for turning movements. The design to be developed will need to consider safe access for all movements and accommodate two way traffic operations. It is accepted that vehicles may encroach across both lanes on Weller Street, if necessary, to complete a tight movement (while not ideal this is better than the existing operation and is typical for the corridor). This is also considered acceptable given the low volumes expected on Weller Street.

Furthermore, the bottom of Weller Street (i.e. the entranceway to the intersection) should be regraded to allow for a more level area at the base as much as possible. The vertical geometry has not been assessed, but it will need to be cognisant with the District Plan requirements and achieve a practical tie-in from the Portobello Road crossfall to the Weller Street gradient of approximately 8%.

Compared to the current situation, the intersection upgrades do not impact pedestrians crossing Portobello Road to access the shared path and eastbound bus stop. The proposal may increase the recreational demand for the shared path, however it is anticipated that the majority of this use will occur outside the peak periods.

Also, it is anticipated that the majority of pedestrians using the eastbound bus stop will be travellers coming home from work, therefore would cross Portobello Road from the seaward side which is situated on the outer bend and is considered the ideal location for crossing, as sight visibility will be maximised.

6.2 Tracking

As demonstrated by the B99 vehicle tracking, the left turn movement from Portobello Road (east) into Weller Street is not practically possible and vehicles currently pull into the pump station and use the opposing bus stop to turn around into Weller Street. Therefore as shown on Figure 17, GHD recommends the use of line-marking and hatching to highlight the tight turn geometry from Portobello Road (east) into Weller Street, with the intent to discourage drivers from making this left turn (or attempting it). However, by using line-marking and not a physical barrier (i.e. kerb), vehicles can still make the tight turn if needed.

This follows from the tracking commentary shown in Table 7, where the u-turn is considered preferable over attempts at making the left turn, with no evidence of safety issues in the crash history. There is no nearby better location to undertake u-turns that drivers could be directed to with signage, so none is suggested.

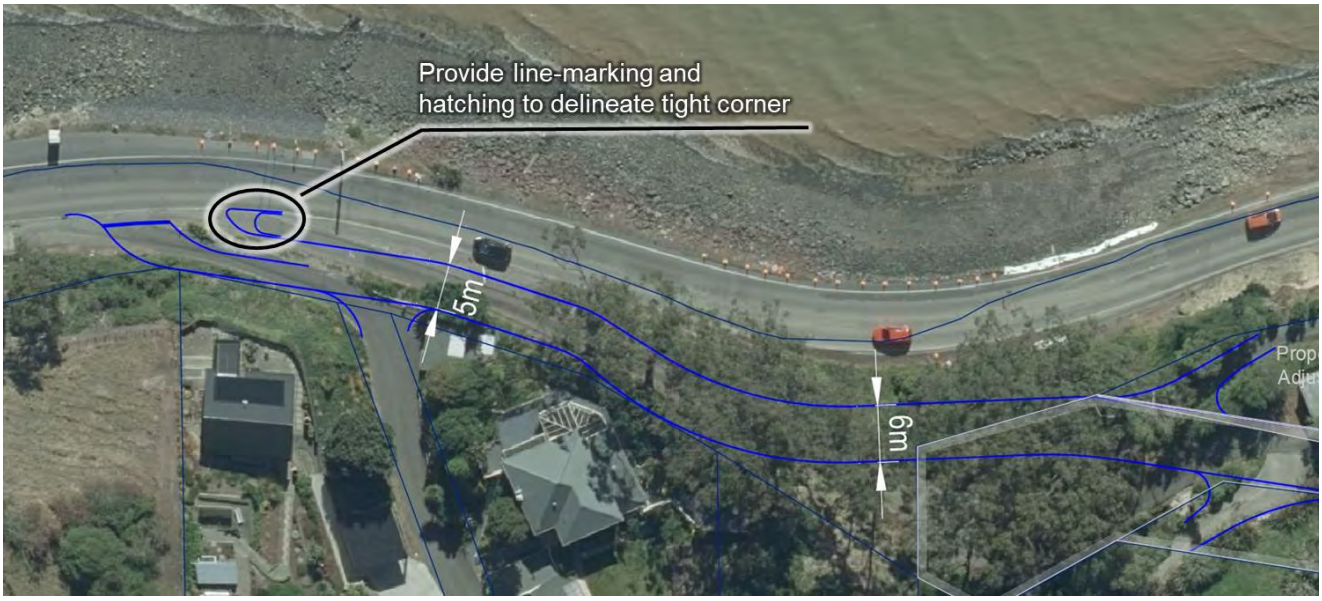


Figure 17 Line-marking and hatching

Further consideration could be made to provide line-marking and hatching to formalise the shoulder along the pump station, to delineate a potential pull over area, to mitigate drivers attempting to undertake a u-turn from the westbound lane (without pulling over first). This area is currently intended for use by maintenance staff/vehicles, related to the pump station and waste collection area.

With regard to street lighting, it is understood that as part of the recent upgrades on Portobello Road, the lighting review outcome was for flag lighting to be provided at new bus stops that are not currently within areas lit by existing carriageway lighting. As such, the existing eastbound bus stop and the new westbound bus stop at Weller Street would have received flag lighting already if a need was confirmed at this location, which has not occurred. So while no recommendation is given, there may be further safety benefit for flag lighting at or near this intersection and this could be raised in discussions with DCC.

Given the concealed nature of Weller Street, it is recommended to install sign PW-26 (shown in Figure 18) for westbound traffic approaching the intersection on Portobello Road. In accordance with MOTSAM Part 1 Section 6, the use of this sign is appropriate where the minor road (i.e. Weller Street) intersects the main road (i.e. Portobello Road) within a horizontal curve in such a location that makes it unsafe to enter the main route.

Figure 18 Recommended PW-26 sign on Portobello Road for westbound traffic approaching Weller Street

6.3 Weller Street Cross Section

GHD has provided a high level summary of the design requirements to be considered in the detailed design of Weller Street cross section, with reference to the DCC Code[3] and the New Zealand Standard NZS 4404:2010 Land Development and Subdivision Engineering (NZS 4404). The DCC Code is originally based on the NZS 4404 guidelines, however it provides additional design information specific to DCC requirements.

For full context, an excerpt of Table 3.1R (DCC Code) and Table 3.2 (NZS 4404) are shown in Figure 19 and Figure 20, outlining the relevant design standards that have been considered in the proposed upgrades for Weller Street.

GHD considers the following road classes to be applicable to Weller Street, acknowledging that these road classes are recommended to service up to 20 dwellings, and Weller Street is anticipated to have 23 lots. However given the low volumes expected on Weller Street, reference to the following road classes is considered to be acceptable:

– DCC Code: 'Minor Residential (cul de sac)' *(noting this has the same widths as 'Short cul de sac')*
– NZS 4404: 'Suburban Live and Play'

Road Design Standards - Urban (speed limit ≤ 70 km/h)

Class	Type	Area served	Traffic volumes (vpd)	Design speed, (km/h)		Road reserve width[1] (m)	Minimum carriageway width (m)				Footpath (m)	Berm (m)	Max/min gradient	Normal camber	Max super-elevation	Notes
				Flat or rolling	Hilly		Parking	Traffic	Cycles	Total						
Local roads	Private Way	1-3 lots 1-6 du	N/A	N/A	N/A	4.5*	none	1 x 3.0	none	3.0*		1.5	16% max ** 0.4% min	3%	NA	Not public street. Long private ways may require passing bays no more than every 60 metres, and turning heads.
	Private Way	4-6 lots 7-12 du	N/A	N/A	N/A	6.5*		1 x 3.5		3.5*		3.0	16% max ** 0.4% min	3%	N/A	Not public street. Long private ways may require passing bays no more than every 60 metres, and turning heads.
	Short cul de sac	<10 du	N/A	N/A	N/A	14.0	***	1 x 6.0		6.0	1 x 2.0	2 x 3.0	16% max **	3%	6%	
	Minor Residential (cul de sac)	<20 du	N/A	N/A	N/A	16.0	***	1 x 6.0		6.0	2 x 2.0	2 x 3.0	16% max ** 0.4% min	3%	6%	
	Residential	<100 du	<850	40	30	16.0	***	1 x 6.0		6.0	2 x 2.0	2 x 3.0	16% max ** 0.4% min	3%	6%	
	Industrial		>300	50	40	20.0	1 x 2.5	2 x 3.5		9.5	2 x 2.0	2 x 3.25	10% max 0.4% min	3%	6%	
	Industrial/ Commercial service lane		N/A	N/A	N/A	8.0		2 x 3.5		7.0		2 x 0.5	10% max 0.4% min	3%	N/A	no parking both sides
Collector roads	Residential	<450 du	<3,000	50	40	20.0	***	2 x 3.0	2 x 2.0	10.0	2 x 2.0	2 X 3.0	12.5% max 0.4% min	3%	8%	
	Industrial/ Commercial		>1,000	50	40	20.0	2 x 2.5	2 x 3.5		12.0	2 x 2.0	2 x 2.0	10% max 0.4% min	3%	6%	
District roads	Residential	>450 du	3,000-7,000	50	50	24.0	2 x 2.5	2 X 3.5	2 x 2.0	16.0	2 x 2.0	2 x 2.0	10% max 0.4% min	3%	8%	Or specific design
Regional	National Road	-	>7,000	70	60	27.0	2 x 3.0	2 x 3.5 1 x 2.0	2 x 2.0	19.0	2 x 2.0	2 x 2.0	10% max 0.4% min	3%	8%	Or specific design

Notes: 1. Total road reserve width = carriageway + footpath/s + berm/s

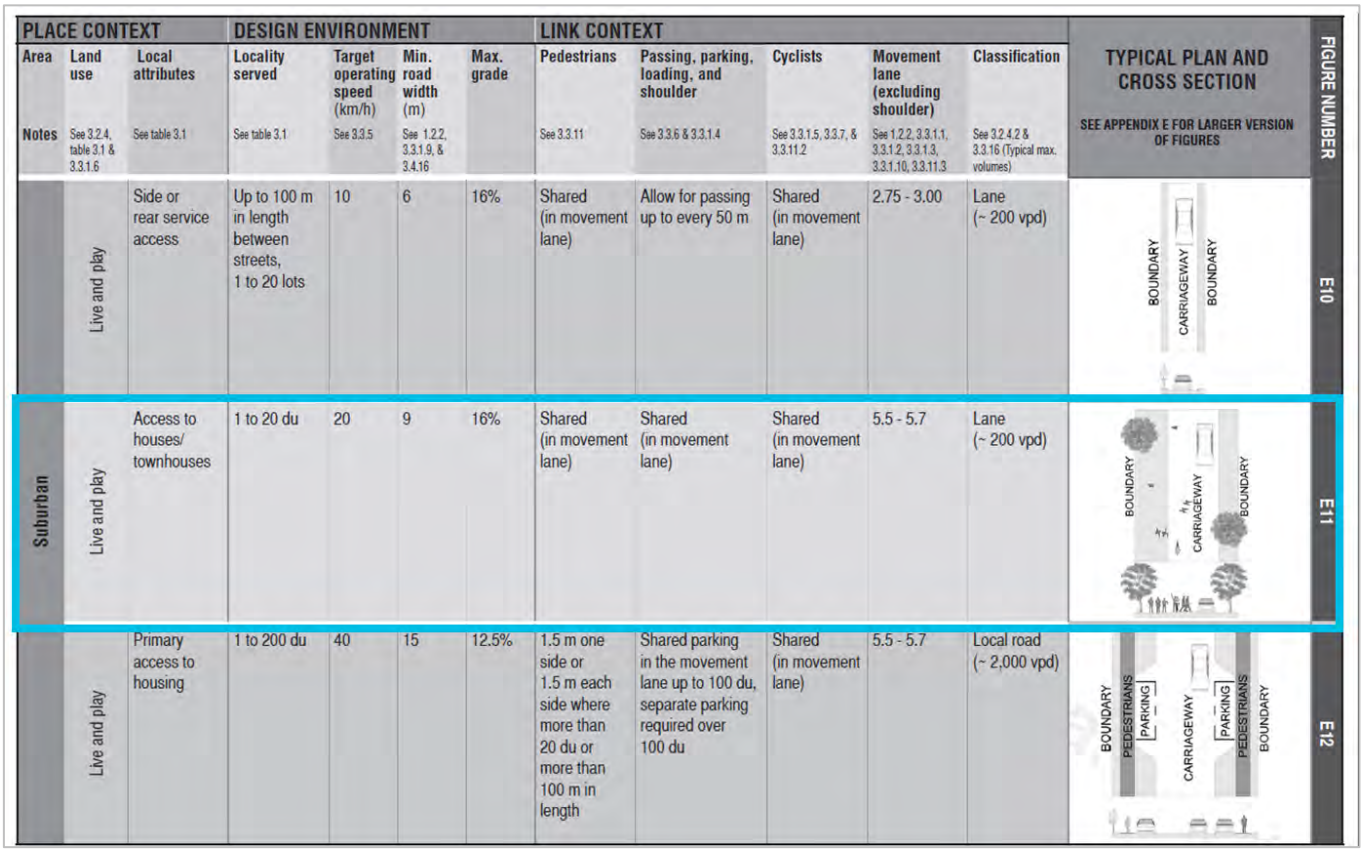
* where a private way adjoins a collector road or higher, it shall have a 5m traffic width and 6m road reserve width for a minimum of 6m for road boundary.

** gradients > 16%, need specific design and must be concrete

*** parking is indented and provides 1 space per 4 dwelling units (du).

[3] Dunedin Code of Subdivision and Development 2010. https://www.dunedin.govt.nz/__data/assets/pdf_file/0019/153163/CP-Dunedin-Code-of-Subdivision-Aug-2010.pdf

Figure 19 Excerpt of DCC Code of Subdivision and Development, Table 3.1R



PLACE CONTEXT			DESIGN ENVIRONMENT				LINK CONTEXT					TYPICAL PLAN AND CROSS SECTION	FIGURE NUMBER
Area	Land use	Local attributes	Locality served	Target operating speed (km/h)	Min. road width (m)	Max. grade	Pedestrians	Passing, parking, loading, and shoulder	Cyclists	Movement lane (excluding shoulder)	Classification	SEE APPENDIX E FOR LARGER VERSION OF FIGURES	
Notes	See 3.2.4, table 3.1 & 3.3.1.6	See table 3.1	See table 3.1	See 3.3.5	See 1.2.2, 3.3.1.9, & 3.4.16		See 3.3.11	See 3.3.6 & 3.3.1.4	See 3.3.1.5, 3.3.7, & 3.3.11.2	See 1.2.2, 3.3.1.1, 3.3.1.2, 3.3.1.3, 3.3.1.10, 3.3.11.3	See 3.2.4.2 & 3.3.16 (Typical max. volumes)		
	Live and play	Side or rear service access	Up to 100 m in length between streets, 1 to 20 lots	10	6	16%	Shared (in movement lane)	Allow for passing up to every 50 m	Shared (in movement lane)	2.75 - 3.00	Lane (~ 200 vpd)	BOUNDARY CARRIAGEWAY BOUNDARY	E10
Suburban	Live and play	Access to houses/ townhouses	1 to 20 du	20	9	16%	Shared (in movement lane)	Shared (in movement lane)	Shared (in movement lane)	5.5 - 5.7	Lane (~ 200 vpd)	BOUNDARY CARRIAGEWAY BOUNDARY	E11
	Live and play	Primary access to housing	1 to 200 du	40	15	12.5%	1.5 m one side or 1.5 m each side where more than 20 du or more than 100 m in length	Shared parking in the movement lane up to 100 du, separate parking required over 100 du	Shared (in movement lane)	5.5 - 5.7	Local road (~ 2,000 vpd)	BOUNDARY PEDESTRIANS PARKING CARRIAGEWAY PARKING PEDESTRIANS BOUNDARY	E12

Figure 20 Excerpt of NZS 4404:2010 Table 3.2

On the basis of the above, the following design standards will be considered in the detailed design of Weller Street cross section, noting some departures may be required due to topographical constraints:

– 9 m to 16 m road reserve width, however due to topographical constraints, there may be locations where the road reserve is the same as the carriageway width.
– 5.5 m to 6 m carriageway width to accommodate two-way traffic flow, however due to topographical constraints, there may be locations where the carriageway is restricted (less than 6m width) with one-way operation, where sight distance allows drivers to anticipate conflicts.
– One dedicated shared path for pedestrians and cyclists is preferable, given the potentially slow uphill speed of users which would conflict with vehicle users. The topographical constraints mean that widening for 2 x 2 m footpaths as per DCC Code may not be practical. A single 2 m wide path is considered suitable given the limited user catchment and allows pedestrians to pass. This path would be available for pedestrians and cyclists, though not formally a shared path. Alternatively, if a separate path cannot be practically accommodated, it is recommended to provide an integrated shared space as per NZS 4404, indicatively 6 m wide plus shoulder or berm, for speeds < 30 km/h.
– 16% maximum gradient is suggested, where a 10% as a target maximum gradient cannot be practically achieved. It is noted that this is unlikely to be suitable for cyclists or mobility devices, which is accepted due to the topography and limited number of dwellings.

Any corresponding earthworks and retaining works required to accommodate the upgrades to Weller Street will be addressed by the Geotechnical specialist.

6.4 Weller Street alignment and improvements

As previously illustrated on Figure 16, GHD has developed a potential schematic layout for the road alignment of Weller Street, to demonstrate the proposed high level changes for Weller Street. However, it is important to note that further design development will occur and this development should include consideration of:

- The new road connection between Portobello Road and the proposed new road alignment to be confirmed following 3D design and a stronger understanding of the topographical constraints.
- While 16% is the absolute maximum gradient, an ideal gradient of 10% is suggested along the entire length of Weller Street towards the proposed site.
- New arrangements for access to all properties on Weller Street which includes the new ROWs, with adequate sight distance where possible. In some locations, sight mirrors may be appropriate.
- Increased road width to accommodate pedestrian and cycle access, waste collection and delivery access, emergency vehicle access, and passing opportunities for residents. Refer to the cross section discussion in Section 6.3.
- Low speed negotiated environment along Weller Street, to provide shared priority for all road users.
- Confirmation of post and waste collection using the existing communal collection point at the bottom of Weller Street, or accommodate provision for waste collection on Weller Street. There is potential for additional communal points along Weller Street, linked by a path. It is noted that it is considered likely that if a fire appliance is able to access Weller Street, a waste collection would also be able to access Weller Street.
- Modify the turning head to allow a fire appliance to safely turnaround in one movement.
- Reconstruction of Weller Street would involve new pavement structure and surfacing along the full length.
- Any need for additional street lighting along the length of Weller Street.
- Opportunity to widen Weller Street at particular locations along its length to accommodate visitor parking / pull over area, where possible and safe. This pullover provision will be useful where the road width is less than 6 m, so that drivers can let opposing users pass .
- Suitable road marking and signage, if any, as is typical for this class of road.
- It is expected that road safety barrier or sight rail will be considered as part of the retaining wall design.
- Integration with drainage features on Weller Street and consideration of safety for all road users, for example ponding, debris collection, and channel shape.
- Maintenance consideration such as vegetation type, access to services, and hardstand areas for maintenance vehicles.

7. Summary of recommendations

In summary, the assessment has identified the following transport-related mitigations that can be achieved with the proposal to address possible effects and align as much as practical with current design guidelines. The proposal involves reconstruction of Weller Street and is expected to significantly improve the long-term safety, legibility and operation of the intersection and Weller Street itself, with benefits to existing residents.

With comparison to the existing situation, the effects of the proposal are anticipated to be:

– Given there are currently no significant safety issues at the site, although with some limited access along Weller Street, the proposal traffic is not adding to the degree of risk, rather it is increasing the frequency of the potential risk events. However, the increase in traffic is considered to have a less than minor effect.
– The-intersection and Weller Street improvements will address some of the existing issues, including the Weller Street approach width for two-way operation, fire appliance access along Weller Street, however it is acknowledged that the proposal still cannot allow for all vehicles to turn left from Portobello Road (east) to Weller Street due to the geographical constraints.
– It is understood that the wider road network (i.e. from Marne Street / Portobello Road intersection to Dunedin central city) is underperforming, however with the inclusion of the proposal traffic, the increase up to 4% of peak bi-directional traffic on this road corridor would not result in any adverse effects of significance
– There are elevated risks associated with the proposal, however the nature of these risks involve low speeds, such that the increased risk on safety is minor, and also not achievable to mitigate due to the physical constraints of the site.

The potential schematic layout will be developed further as a concept design, and this is likely to include retaining and earthworks. This future design will inform geotechnical and landscaping outcomes. In matters of discretion, the site constraints and limited user catchment are expected to be acknowledged.

The recommended mitigations are:

1. **Local widening on Weller Street approach at the intersection** to accommodate two-way vehicle access and ease turning movements. This area should be regraded to provide a flatter manoeuvring area and allow longitudinal drainage along Portobello Road.
2. **‘Concealed exit’ permanent warning sign** (PW-26) for westbound traffic approaching the intersection on Portobello Road.
3. **The Minimum Gap Sight Distance requirements should be achieved in the intersection design**, especially the 83 m for right turns from Weller Street to Portobello Road (currently not achieved). Achieving the 123 m Safe Intersection Sight Distance is ideal if practical. The design should not worsen sight distance from the existing.
4. **Flag lighting** could be installed at bus stops on Weller Street that are not currently lit by carriageway lighting, however no lighting was installed by the Peninsula Connection project for the new westbound bus stop at Weller Street. There may be further safety benefit for flag lighting at or near this intersection and this could be raised in discussions with DCC.
5. **Reconstruction of Weller Street** to include new pavement structure and surfacing, with associated retaining and landscaping works as required
6. **Fire appliance access** to be accommodated at the intersection and along Weller Street to the proposed turning head. This is considered to apply only for the turn movements from / to Dunedin.

7. The cross section is assumed to be a 6 m wide carriageway and is recommended to generally allow two-way traffic flow. At constrained locations this width may be narrower to one-way flow, where:
    a. **sight distance should be provided to allow drivers to anticipate conflicts** at 30 km/h**.**
    b. **clear width of at least 6 m should be provided to allow drivers to pull over** to let other users pass and appropriately deal with constraints.
8. **The cross section should allow for a single 2 m path**, given the potentially slow uphill speed of pedestrian and cyclist users which would conflict with vehicle users.
9. While a 16% maximum gradient is allowed, **a 10% target maximum gradient is recommended where practical**, to mitigate the effects of steeper grades for cyclists or mobility devices.

However due to existing site constraints, there is likely to be some departures from the detailed design guidelines and standards that will require some acceptance. These departures may include:

1. **Road reserve and carriageway width** on Weller Street, including at constrained points
2. **Dedicated path provision** along Weller Street, as a single path or integrated shared space.
3. **Provision for left turn in movements** (i.e. u-turns) from Portobello Road (east) to Weller Street for all vehicles (as this movement may not be possible even for small passenger cars), which means accepting ongoing use of u-turns instead.

As next steps, concept design is required to inform the degree of mitigation possible within the site constraints. Then this concept design should be used to inform in-depth discussion with DCC on requirements, especially on discretionary matters. This concept design will involve interface with geotechnical and landscape inputs.

Project Risks

A number of risks are noted for future consideration. The indicative design has been limited to a 2D schematic which means at this stage there is limited knowledge with regard to what can be practically or feasibly provided. Retaining walls and landscaping solutions are assumed to be able to be implemented within the corridor available. It is understood that there have not yet been landowner discussions on the impacts to accesses and no discussions directly with DCC, which may also identify other requirements or limitations. It is also noted that a safety audit of this proposed arrangement has not yet been completed, and should be undertaken based on the future concept design.

Appendix A

Terramark submission for Variation 2

SUBMISSION ON THE DUNEDIN CITY COUNCIL'S PROPOSED VARIATION 2 OF THE SECOND GENERATION DISTRICT PLAN

Form 5
Submission on publicly notified proposal for policy statement or plan
Clause 6 of First Schedule, Resource Management Act 1991

To: Dunedin City Council
districtplansubmissions@dcc.govt.nz

Name of submitter: Joe Morrison and Gill Thomas
for
GTJM Property Limited

Contact Person: Darryl Sycamore

Address for service: Terramark Limited
P.O Box 235
Dunedin 9054

Phone: 03 477 4783
Email: darryl@terrramark.co.nz

This is a submission on the following proposed plan change – Variation 2 of the Second Generation District Plan.

GTJM Property Limited could not gain an advantage in trade competition through this submission.

The specific provisions of the proposal that the submission relates to and the decisions we seek from Council are as detailed on the following pages.

GTJM Property Limited wishes to be heard in support of this submission.

SUBMISSION ON VARIATION 2 OF THE SECOND GENERATION DISTRICT PLAN

1. INTRODUCTION

1.1 GTJM Property Limited welcomes the opportunity to submit to the Variation 2 of the 2GP.

1.2 They own the property at 336 and 336A Portobello Road which has a northerly aspect and is offered sweeping views over the Otago Harbour, west harbour landforms and the hinterland mountains.

1.3 The site is a semi-regular property oriented north-south behind the first row of housing adjacent Portobello Road. The site has a narrow leg-in heading west out to Weller Road running alongside the title of 336A Portobello Rd, itself a small rectangular parcel.

1.4 The site is zoned Rural Residential 2 in the Dunedin City Second-Generation District Plan (2GP). It is subject to an archaeological alert overlay and is partially within the North-West Peninsula Significant Natural Landscape (SNL) zone.

1.5 Land use consent (LUC-2020-106) was obtained in May 2020 to authorise a new dwelling which extends over the boundary into the SNL.

1.6 As part of the land capability assessment of Variation 2, Council identified the site as being suitable for further intensification. Variation 2 now seeks to rezone the lower extent of the site to Township & Settlement consistent with the surrounding land. The upper portion of the site which is within the SNL will remain as Rural Residential 2.

1.7 GTJM Property Limited support the proposed rezoning of the land to Township & Settlement.

2. SITE DESCRIPTION

2.1 The property comprises a number of parcels in two Records of Title.

2.2 The property of 336 Portobello Rd is contained in record of title number OT312/165 (Limited as to Parcels) and contains an area of 7.28 hectares. It is legally described as Lot 25 DP 5628 and Part Sections 45-46 Upper Harbour East Survey District. Lot 25 DP 5628 is a small parcel which fronts onto and provides legal access to Weller Street.

2.3 The property of 336A Portobello Rd is contained in record of title number OT310/57 and contains an area of 222m². It is legally described as Lot 22 DP 5628 and is legally landlocked. Physical access to this title relies on illegal access over 336 Portobello Road.

2.4 The site has legal frontage to Weller Street, although this comes with some constraints.

2.5 DCC Water and Drainage Service GIS records indicates that a DCC owned 100mm foul sewer is located within or near the site as it fronts Portobello Road ending in a manhole. This main itself drains via gravity to the East Harbour No.2 pumping station. Crossing through the south eastern corner of the site is the DCC's 150mm water trunk main circa 1968.

2.6 Other than a narrow section alongside the rear of the northern neighbouring properties the site rises steeply up toward the south with an average grade of 1v in 3h. There are no known natural hazards

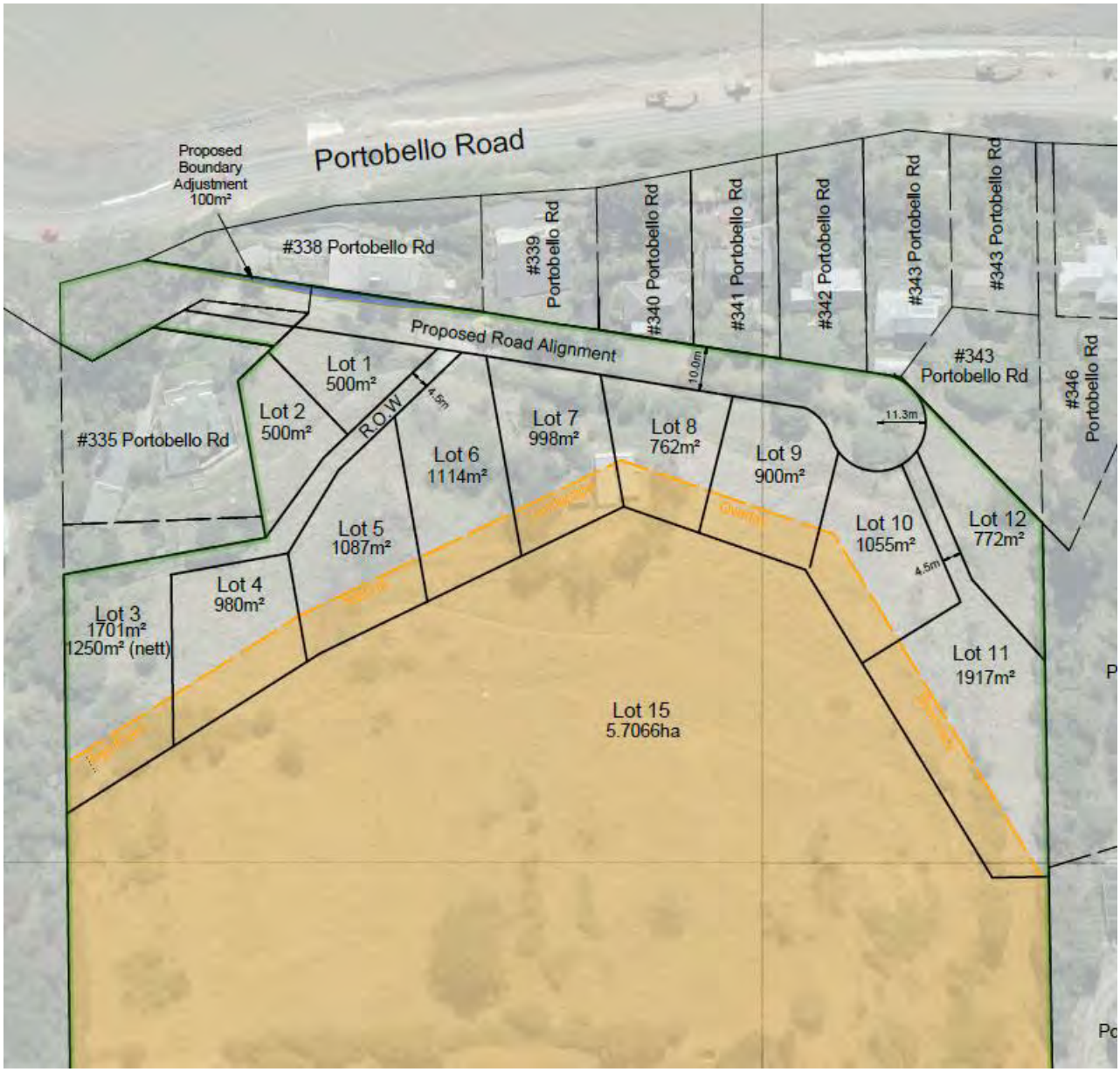
recorded in the 2GP for the subject site. It is noted however, that the 2019 LIM refers to a Class 3 hazard risk based on a historical broad assessment[1].

2.7 The site is subject to a live appeal (ENV-2018-CHC-285) by The Preservation Coalition Trust which relates to the SNL.

3.0 VARIATION 2 REZONING AND DEVELOPMENT CONCEPT

3.1 Council staff carried out a site visit to assess whether the site was suitable for further development. It was accepted the site met the initial criteria for inclusion in Variation 2.

3.2 GTJM Property has since obtained a high level transportation assessment and prepared a site plan of their intentions should the Hearings Panel adopt the rezoning proposal.



3.3 The proposed site layout seeks to adopt the most efficient use of the land whilst respecting the topographical constraints and the SNL in the upper extent of the property. Key aspects of the plan include:

[1] Effects of Basement Lithology, Regolith and Slope on Landslide Potential, Otago Peninsula, New Zealand. Leslie (1974).

- The creation of 12 new lots,
- Consent notices will be adopted for each new unit controlling the form, colours and materials of bulk to ensure they respect the existing controls for landscape zones.
- A revised access formation and passing bay to improve vehicle access and visibility,
- A 10m wide proposed road formation, with a 22m diameter turning head,
- A 4.5m wide Right of Way
- Formalising the access rights to #335 Portobello Road. This property currently extends into the subject site. GTJM Property welcome the opportunity to remedy the existing issues associated with access.
- Lots 3-11 will each have a portion of the SNL within the rear yard where a consent notice is volunteered limiting any development to that authorised as a permitted activity.
- Proposed Lot 15, comprising 5.7 hectares, being the remainder of the SNL will be protected in perpetuity. This area will be progressively planted out in native plant species typical of the peninsula. Several paths and discrete areas within the SNL will be left unplanted and grassed with outdoor furniture. Proposed Lots 3-12 will each have rights to use the land for their families enjoyment to utilise the area.
- All aspects of the development will be mindful of the relief sought in the live 2GP Environment Court appeal ENV-2018-CHC-285.

3.4 GHD Limited provided a high level transport assessment on the site and on what would be needed at the Weller Street and Portobello Road intersection to identify areas where consideration is needed for a layout compliant with relevant design guidelines and planning rules (or an acceptable layout with mitigation).

3.5 The existing access does not comply with the 2GP standards, but it will be greatly improved as part of the development to provide an acceptably safe and connected transport outcome with suitable mitigation treatments. This will be detailed further during the hearing.

3.6 GTJM Property are currently in the process of obtaining

- visual simulations and a landscape assessment, and
- site specific geotechnical assessment for each Lot.

4.0 SPECIFIC RELIEF

4.1 Infrastructure

We oppose the imposition of network upgrades as a condition of development.

Council has a development contributions policy and a rating program that generates increased income as new residential sites are created. Both of these income sources provide funding that is intended to be spent on City infrastructure (development contributions for network upgrades, rating income for maintenance). While income from these sources is being collected by Council it is inappropriate (and a form of double-dipping) for network infrastructure upgrades to be imposed as conditions of development.

Relief Sought

1. That Council upgrade the network to enable the proposed development permitted under Variation 2, and
2. That infrastructural upgrades are funded by either development contributions and rates, and
3. That network upgrades are not a condition of development.

4.2 Rule 15.4.X The Permitted Baseline

Rule 15.4.X seeks to remove the permitted baseline assessment from Council's consideration of stormwater matters. We accept the permitted baseline is a matter of discretion on a case by case basis, however it provides a clear indication as to the effects arising from a permitted activity which

has undergone a Schedule 1 process. It is assumed the effects arising from a permitted activity are less than minor on the receiving environment.

Discounting the permitted baseline is a cynical attempt to dismiss any weight in favour of a development, which seeks to construct a rule in a lower-level regulation to override that of a higher-level regulation. Recent consent decisions have found that the permitted baseline assessment is an appropriate test in respect of stormwater management (in the same way as this applies to the consideration of other effects).

Relief Sought
1. That this provision be rejected.

4.3 336 Portobello Road has been identified as a greenfields development site, within which new residential activities are proposed to take place by virtue of the rezoning to Township & Settlement zone. The site is also subject to a New Development Mapped Area (NDMA) overlay provision which includes greater infrastructure controls.

GTJM Property considers it is inappropriate to impose new NDMA/infrastructure controls onto the submission property where these controls might negatively affect development and subdivision activities. This approach is inconsistent with the intent of Variation 2, specifically to enable additional housing supply.

There remains a question over the quality and completeness of Council's infrastructure modelling, with particular regard to the stormwater network. It appears that Council's 3-Waters department has taken a precautionary approach to infrastructure, whereby it is simply easier to require all new developments to meet the new infrastructure standards, despite some of these areas not necessarily being subject to an infrastructure constraint.

If this is the case then this will lead to the installation of infrastructure, proposed to occur at the cost of the landowner/developer, that serves no purpose. This is inappropriate and contrary to the outcomes sought by Variation 2. If Council's infrastructure modelling knowledge is incomplete, it is essential that this is resolved before any new infrastructure controls are implemented.

Relief Sought
1. That Council develop at their cost a full understanding of the infrastructural model and constraints, and
2. That the NDMA area is nuanced to reflect the full understanding of infrastructural capacity rather than ad hoc and precautionary.

4.4 Policy 9.2.1.1A

This policy seeks to impose wastewater requirements on land within wastewater service areas. Again, if the network infrastructure is not adequate to support development in accordance with the zone density, the submitter considers that it is Council's responsibility to resolve this prior to development occurring.

Relief Sought
1. That the policy is deleted.

4.5 Policy 9.2.1.BB

This policy requires specified new development mapped areas to provide communal wastewater detention systems. GTJM is agreeable to this provided that the specified areas have been correctly assessed by Council in respect of infrastructure requirements rather than an ad hoc and precautionary approach.

4.6 Policy 9.2.1.Z

This policy requires development that contravenes the impermeable surfaces rules to demonstrate that the effects of stormwater will be no more than minor. GTJM seeks to clarify that subdivision and land use only triggers the policy when they propose to breach the impermeable surfaces rules.

The policy appears to read this way; however, an alternative interpretation might be that the policy applies to multi-unit development, supported living facilities, and subdivision all in general, and only to development that breaches the impermeable surfaces rules. In addition, all stormwater flows off the site will end up as a discharge to the harbour, which if the second part of the policy is read literally, would always trigger the need for an assessment under this part. The submitter does not believe that this is the actual intent of the policy.

Relief sought

1. That the policy is reworded to remove any ambiguity.

4.7 Policy 9.2.1.Y

This policy requires all subdivision in a new NDMA area to install an on-site stormwater management system. GTJM has several concerns about this policy. Primarily, there are some fundamental differences between the types of NDMA areas and complex on-site stormwater management systems should only be required where

i) the land in question is a new greenfields site, and
ii) ii) Council's stormwater modelling can clearly show that development of the site (without stormwater controls) is likely to lead to unacceptable adverse effects downstream.

Where proposed NDMA regions occur that do not meet the above criteria, such at 336 Portobello Road where stormwater goes to the harbour, the requirement for stormwater infrastructure should be removed.

Relief sought

1. Re-write this policy to relate only to those sites where both criteria are met.

4.8 Service connections onsite

Variation 2 proposes new rules relating to service connections on subdivision sites. These provisions ae contained in Rule 9.3.7, and particularly Rules 9.3.7.X, 9.3.7.Y, 9.3.7.Z and 9.3.7.AA.

There is insufficient allowance within these service connection provisions for viable alternative supply options. Several examples include:

- Telecommunications using 'off-the-grid' sources (cell phone, radio link, satellite link, etc.).
- Electricity using 'off-the-grid' sources (wind, solar, generator, etc.).
- Water supply by rooftop collection in areas that cannot be efficiently serviced from a reticulated source.
- Foul drainage via septic tank (or secondary-treatment septic tank) in areas that cannot be efficiently serviced from a reticulated sewage system.
- Stormwater to ground in areas where there are subsurface gravel layers that can accommodate site discharge flows.

There are likely to be a number of other forms of alternative solution as well, which are just as capable of providing acceptable servicing outcomes.

Relief sought

1. That the inclusion within Rule 9.3.7 of suitable alternative servicing arrangements, where these are recognised as being acceptable (certainly all of the examples above, plus other forms of servicing that may be appropriate). Some of these options may require the applicant to demonstrate that the alternative solution will achieve a particular standard. Furthermore, it should be recognised that a number of these alternative solutions are better implemented at the time of building (rather than the time of subdivision). Accordingly, the inclusion of a provision that recognises the use of a

consent notice to require installation of service connections as part of the building process is also sought by the submitter.

4.9 Transportation Provisions

Variation 2 proposes several new transportation policies and rule adjustments. is concerned about Policy 6.2.3.Y and Rules 6.11.2.7 and 6.11.2.8. There is no justification by Council to impose the expectation that any private access serving more than 12 sites should be designed and vested as a legal road.

GTJM Properties considers that private access serving an unlimited number of sites is entirely reasonable, and that a legal road should only be required when the other assessment matters trigger this (e.g., for reasons of network connectivity and/or safe and efficient operation of the transport network). This is particularly relevant for access to 336 Portobello Road.

There are likely to be many situations in which it will be difficult for Council to impose these proposed rules, a common example being infill subdivision that occurs along existing private accessways. The allowance in the rules for '...unless the location or design of the subdivision lacks certainty as there is no guidance as to how Council's discretion in this regard will be applied.

Should GTJM construct a private road for the proposed development at 336 Portobello Road, and purchasers choose to buy sites on that basis, this would seem like a perfectly reasonable outcome (and with no risk to Council).

Relief Sought

1. That the transportation provisions are drafted such that they enable (where the outcome will result in a safe and efficient development) are that the Council's discretion is clearly understood rather than on an ad hoc basis.

For Terramark Ltd

Darryl Sycamore
Resource Management Planner

Appendix B

Community submissions to proposal

Submitter number	Submission description (directly quoted)
S41, S46, S53, S72, S165	– There is a "significant issue" with the steepness of the site slope. Both "instability" and "geotechnical assessment required" are mentioned in appendix 6.12 of the Section 32 document. Previous slipping has occurred onto Weller St at No.332. This environment is already unstable. Development, if rezoning occurs, will exacerbate this. – Potable water connection requires either "significant network extensions" (appendix 6.12) if connected to the Portobello Rd system and at least something superior to the current use of garden hose connections (as several residents have at present) if connecting up to the Highcliff Rd system. Development, if rezoning occurs, will exacerbate this . – Wastewater removal is identified as an issue and "requires detailed investigation" for a "downstream upgrade" (appendix 6.12). A further upgrade will certainly be necessary if extra connections are made to it . – Stormwater culverts "likely need to be upgraded for capacity and erosion protection" (appendix 6.12). Surface storm water is already a regular issue for some residents (at No.342 and 343). Development, if rezoning occurs, will exacerbate this. Stormwater erosion of the cliff face is already a regular occurrence along Portobello Rd. – The road network into Dunedin that Portobello Rd connects to will have its "current under-performance further exacerbated" (appendix 6.12). Weller St will also have its current inadequacy (width, surface, single lane) further exacerbated if development occurs as a result of rezoning . – A "feasible capacity of 5 dwellings" (appendix 6.12) neither specifies nor limits what a developer may later apply to implement. Any number at all will proportionally increase all 5 of the issues already referred to above, already experienced by existing residents . – Organisations such as The Coalition Preservation Trust and Save The Otago Peninsula (STOP) are both already involved in appeal and mediation processes (respectively) to "extend the significant natural landscape" over such rural sites as this one ie. exactly the opposite to rezoning the site to Township and Settlement. Extending the natural landscape is preferable to extending the Town and Settlement zone for existing residents . – DCC has not provided, either in the Section 32 report appendices or in any other form, how any development following the proposed rezoning might affect infrastructure for the existing nine residences. Appendix 6.12 does refer to improving the intersection with Portobello Rd being given "consideration at subdivision stage". This implies that there will be no consideration given if such sub-division does not occur and it does not even refer to any other aspect of infrastructure requirements. The non-availability (requested 16th Feb) of a recent report on Weller St to DCC Transportation Dept is of concern as anticipated planning for our local environment is not being shared with us . – DCC has not shown any awareness in appendix 6.12 of such issues as Weller St's current close proximity to houses (at No.338), to retaining walls (at No.333), to a neighbouring shared driveway (to No.330, 332 and 333) and to the gum trees at the bottom end of Weller St (which are valued by the community both as character landmarks and as stabilisers of the bank down to Portobello Rd). All of these are preventing (or seriously affecting) the widening needed for improved access from Portobello Rd that is to be "considered at subdivision stage" (appendix 6.12). Perhaps these factors are in the report we cannot access, but we currently do not know how much DCC is aware of these specific aspects of our environment. – DCC is not convincing in showing it knows where Weller St actually is. The DCC planning map is at variance with Google Maps and both are inconsistent with on-the-ground identification of which roadway is Weller St and which others are merely shared driveways off Weller St. We need to know that DCC knows where any improvements to Weller St such as road widening would be applied? We need to know what other infrastructure improvement (like footpaths, gutters, stormwater drains, street lighting, 2-way vehicle access or visitor parking) are planned? We cannot support a rezone leading to more development without this information.
S102	– Instability of slope. There have many slips. Surface water laminar flow is an enormous issue for us already. This landscape is unstable. If rezoning occurs we have concerns over the changes in water flows leading to cliff face erosion, instability of the right of way and retaining wall inundation.

Submitter number	Submission description (directly quoted)
	– Weller Street is presently unmaintained. In its current form its single lane access onto busy Portobello Road is already at capacity servicing 7 dwellings. Any redevelopment of this "street" to allow for two way access onto Portobello Road will have significant fiscal ramifications for Council and any other interested roading authority. We are not convinced that Council is actually aware of the physical limitations of access. – Wastewater removal will require significant upgrading both within the rezone area but also downstream within the network to cope with the increase. – Extending the natural landscape is preferable to extending the Town & Settlement zone.
S180	I submit that the environmental effects on the existing nine residents are potentially severe, and I cannot support a rezoning leading to more development without more information and strict limits. My specific reasons include: – Steepness of the site slope ("instability" and "geotechnical assessment required" are mentioned in appendix 6.12 of the Section 32 document). This environment is already unstable, and previous slipping has occurred onto Weller St at No.332 at least 4 times in the last 10 years, and also onto my section from the proposed rezoned land at 343 in the past. Development, if rezoning occurs, will likely exacerbate this and exacerbate an existing hazard for residents. No specific investigation appears to have been undertaken. – Development, if rezoning occurs, will also exacerbate inadequacies already being experienced by existing residents with the • potable water connections • wastewater removal (identified as an issue and "requires detailed investigation" for a "downstream upgrade" (appendix 6.12) • Stormwater culverts ("likely need to be upgraded for capacity and erosion protection"; appendix 6.12). Surface storm water is already a regular issue for some residents (at No.342 and myself at 343) Stormwater erosion of the cliff face is already a regular occurrence along Portobello Rd. • The road network into Dunedin that Portobello Rd (which will have its "current under-performance further exacerbated" (appendix 6.12). • Weller St will also have its current inadequacy (width, surface, single lane) further exacerbated if development occurs as a result of rezoning. The appendix 6.12 does not address issues including Weller St's current close proximity to houses (at No.338), to retaining walls (at No.333), to a neighbouring shared driveway (to No.330, 332 and 333) and to the gum trees at the bottom end of Weller St (which are valued by the community both as character landmarks and as stabilisers of the bank down to Portobello Rd). – DCC has not provided any indication that it is aware of these limitations nor shown how development following the proposed rezoning might affect them and the existing nine residences. – This environment cannot support the number of dwellings that a developer would potentially need to construct to cover the associated infrastructure costs. – The "feasible capacity of 5 dwellings" is neither specified nor limited, and the effects above will expand with the number of dwellings."
S182	Prolonged rainfall events frequently cause flooding of properties below the proposed zoning change area and in the past major slips have blocked access and egress to the residents, which highlights the instability of the land. The topography and catchment area of the sizeable tract of land above the proposed zone change area is very steep and without any managed stormwater mitigation. Disturbance through any development of the land in the proposed zone change area will exacerbate further erosion. Historically, the land within the proposed zone change area was used for market gardening and a network of clay drainage pipes was installed. Over time damage has interrupted their functionality adding to the problem.

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→ The Power of Commitment

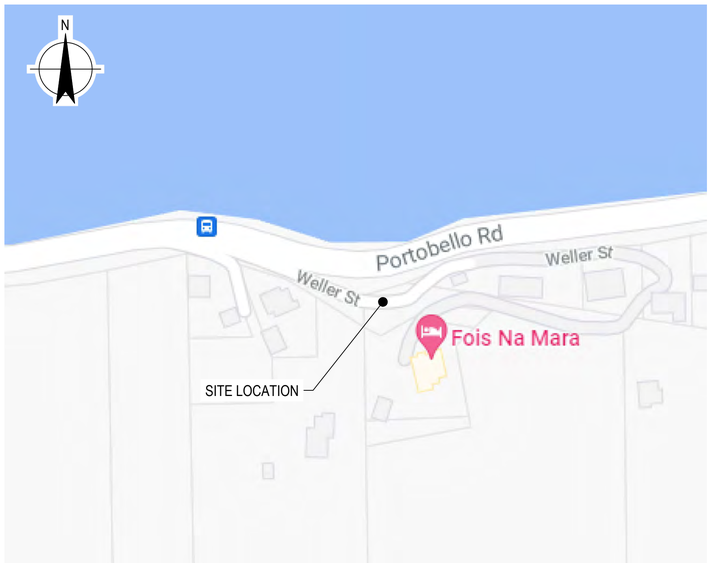
Attachment B

GTJM PROPERTY LTD

terramark
setting new boundaries

GTJM PROPERTY LTD
WELLER STREET - CONCEPT DESIGN
12537363

GHD



LOCALITY PLAN
NTS

WELLER STREET - CONCEPT DESIGN - CIVIL DRAWING LIST	
DRAWING NO.	DRAWING TITLE
G001	COVER SHEET, DRAWING LIST AND LOCALITY PLAN
C010	PLAN AND LONGITUDINAL SECTION
C011	LAYOUT PLANS
C020	TYPICAL SECTIONS
C051	CROSS SECTIONS SHEET 1 OF 4
C052	CROSS SECTIONS SHEET 2 OF 4
C053	CROSS SECTIONS SHEET 3 OF 4
C053	CROSS SECTIONS SHEET 4 OF 4

Rev	Description	Checked	Approved	Date
A	PRELIMINARY - CONCEPT DESIGN	GR*	DM*	15.02.22

Author B. RAJ **Drafting Check** G. DOUGHERTY*
Designer P. KITTO **Design Check** R. STEENKAMP*

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Project No. 12537363

Client GTJM PROPERTY LTD

Project WELLER STREET - CONCEPT DESIGN

Status PRELIMINARY Status Code S2

Drawing Title COVER PAGE, DRAWING LIST AND LOCALITY PLAN

Size A1

Drawing No. 12537363-G001

Rev A

Plot Date: 15 February 2022 - 11:50 AM Plotted by: Brian Raj

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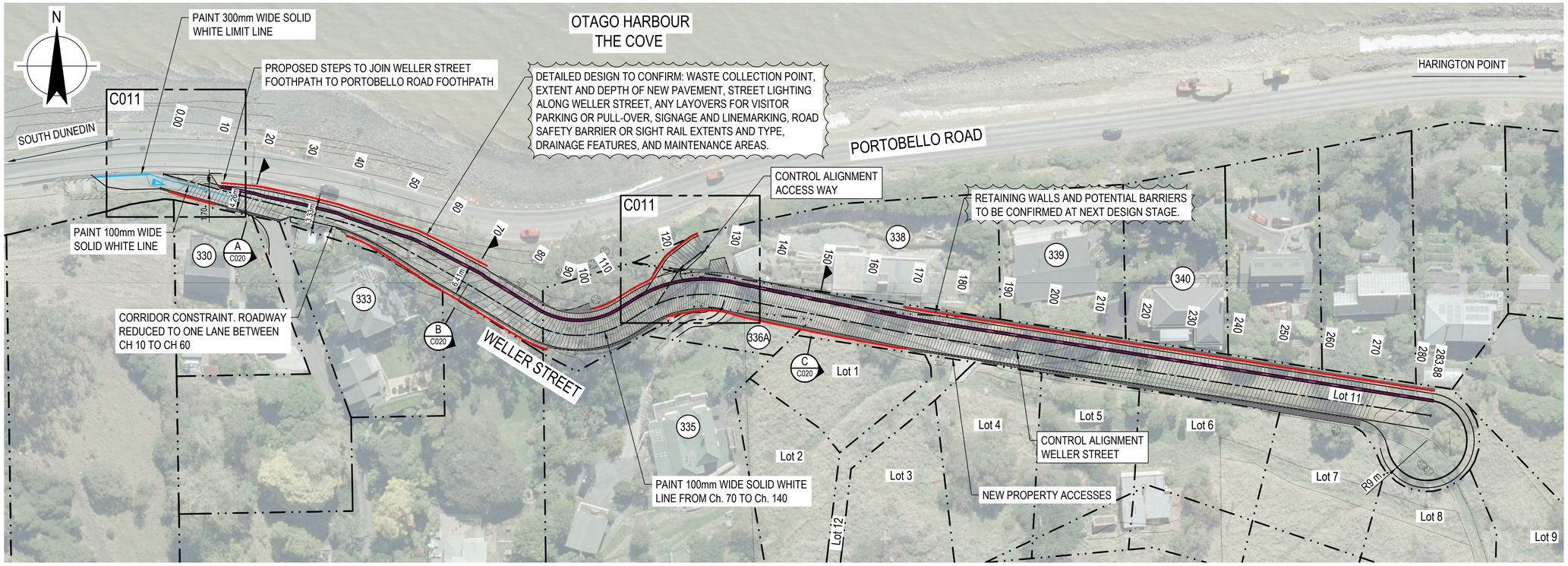


PAINT 300mm WIDE SOLID WHITE LIMIT LINE

PROPOSED STEPS TO JOIN WELLER STREET FOOTHPATH TO PORTOBELLO ROAD FOOTPATH

DETAILED DESIGN TO CONFIRM: WASTE COLLECTION POINT, EXTENT AND DEPTH OF NEW PAVEMENT, STREET LIGHTING ALONG WELLER STREET, ANY LAYOVERS FOR VISITOR PARKING OR PULL-OVER, SIGNAGE AND LINEMARKING, ROAD SAFETY BARRIER OR SIGHT RAIL EXTENTS AND TYPE, DRAINAGE FEATURES, AND MAINTENANCE AREAS.

CONTROL ALIGNMENT ACCESS WAY

RETAINING WALLS AND POTENTIAL BARRIERS TO BE CONFIRMED AT NEXT DESIGN STAGE.

PAINT 100mm WIDE SOLID WHITE LINE

CORRIDOR CONSTRAINT. ROADWAY REDUCED TO ONE LANE BETWEEN CH 10 TO CH 60

PAINT 100mm WIDE SOLID WHITE LINE FROM Ch. 70 TO Ch. 140

CONTROL ALIGNMENT WELLER STREET

NEW PROPERTY ACCESSES

PLAN

SCALE 1:500

LEGEND - EXISTING

— · · — · · —	LEGAL BOUNDARY LINE
○336	PROPERTY ADDRESS
— — — —	EDGE OF SEAL
—//——//—	FENCES
▨	BUILDING
✿	TREES
⊕ ●✳ °	STREET LIGHTS, POWER POLES, TELECOM POLE
⌐ ○	ROAD SIGNS
▭ ○ ● ●	SUMPS, MANHOLES
•	SURVEY MARKS
⊕ ▢	HYDRANTS, WATER METER
▯ ○	LETTERBOX, RUBBISH BIN

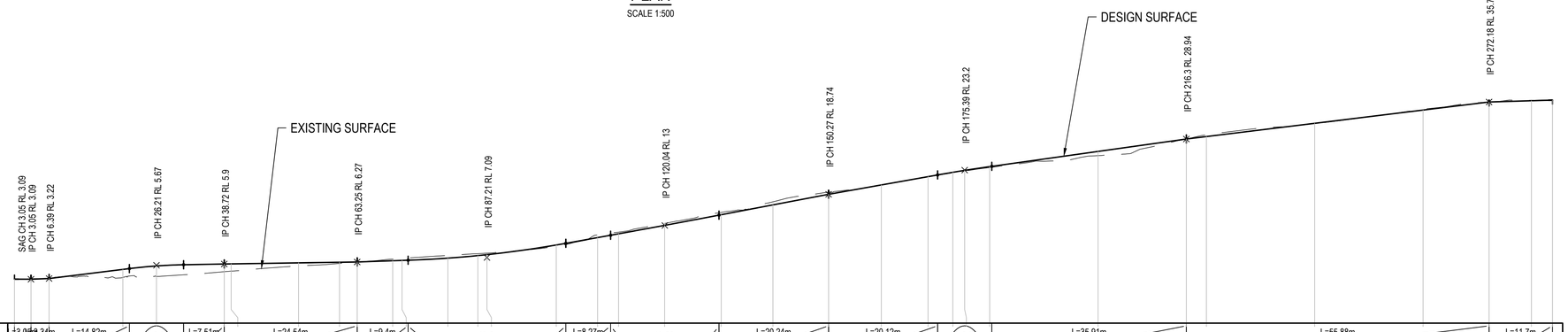
LEGEND - PROPOSED

—·—+—·— 100	CONTROL ALIGNMENT AND CHAINAGE
🟥	RETAINING WALL
▬	KERB AND CHANNEL
———	EDGE OF SEAL
———	100mm WIDE SOLID WHITE LINE
———	300mm WIDE SOLID WHITE LIMIT LINE
▻	GIVEWAY SYMBOL

NOTE:

DETAILED DESIGN TO CONFIRM:

a. WASTE COLLECTION POINT,
b. EXTENT AND DEPTH OF NEW PAVEMENT,
c. STREET LIGHTING ALONG WELLER STREET,
d. ANY LAYOVERS FOR VISITOR PARKING OR PULL-OVER, SIGNAGE AND LINEMARKING,
e. ROAD SAFETY BARRIER OR SIGHT RAIL EXTENTS AND TYPE,
f. DRAINAGE FEATURES,
g. AND MAINTENANCE AREAS.



DATUM RL. -5.00

VERTICAL ALIGNMENT

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- L=14.82m, G=12.35%
- K=0.95, L=10m
- L=7.51m, G=1.86%
- L=24.54m, G=1.49%
- L=9.4m, G=3.44%
- K=2, L=29.12m
- L=8.27m, G=18%
- K=20, L=20m
- L=20.24m, G=19%
- L=20.12m, G=17.75%
- K=2.68, L=10m
- L=35.91m, G=14.02%
- L=55.88m, G=12.21%
- L=11.7m, G=2.98%

HORIZONTAL ALIGNMENT

- L=20.69m
- L=10.05m
- L=9.40m
- L=12.29m, R=50.00m
- L=17.37m
- L=1.73m, R=50.00m
- L=14.00m
- L=22.09m, R=-20.00m
- L=3.88m
- L=18.95m, R=25.00m
- L=38.18m
- L=4.57m, R=-100.00m
- L=110.68m

CHAINAGE	EXISTING SURFACE LEVEL	DESIGN SURFACE LEVEL	LEVEL DIFFERENCE CUT - / FILL +
0.00	3.11	3.103	-0.00
3.05	3.18	3.087	-0.09
6.39	3.36	3.219	-0.14
20.00	3.42	4.900	1.48
26.21	3.60	5.536	1.94
38.72	4.48	5.900	1.42
40.00	4.58	5.919	1.34
52.43	5.53	6.105	0.57
60.00	6.00	6.217	0.22
63.25	6.27	6.266	0.00
69.81	6.80	6.492	-0.31
71.53	6.93	6.551	-0.38
80.00	7.48	6.977	-0.50
85.53	7.80	7.448	-0.35
87.21	7.90	7.620	-0.28
100.00	9.15	9.401	0.25
107.62	11.26	10.764	-0.49
111.50	11.76	11.464	-0.29
120.00	13.36	13.018	-0.35
130.45	15.39	14.978	-0.41
140.00	17.36	16.793	-0.57
150.27	19.17	18.744	-0.42
160.00	20.49	20.471	-0.02
168.63	21.96	22.002	0.05
173.20	22.69	22.799	0.11
175.39	23.03	23.156	0.13
180.00	23.67	23.849	0.18
200.00	25.87	26.652	0.79
216.30	28.94	28.938	0.00
220.00	29.71	29.389	-0.32
240.00	31.82	31.831	0.02
260.00	34.43	34.273	-0.15
272.18	35.76	35.761	0.00
280.00	36.08	35.994	-0.08
283.88	36.11	36.109	0.00

LONGITUDINAL SECTION - WELLER STREET

HORZ 1:500 VERT 1:500

Rev	Description	Checked	Approved	Date
A	PRELIMINARY - CONCEPT DESIGN	GR*	DM*	15.02.22

Author B. RAJ **Drafting Check** G. DOUGHERTY*
Designer P. KITTO **Design Check** R. STEENKAMP*

0 5 10 15 20 25m
SCALE 1:500 AT ORIGINAL SIZE

GTJM
PROPERTY
LTD

terramark
setting new boundaries

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Project No. 12537363

Client GTJM PROPERTY LTD

Project WELLER STREET - CONCEPT DESIGN

Status PRELIMINARY Status Code S2

Drawing Title PLAN AND LONGITUDINAL SECTION

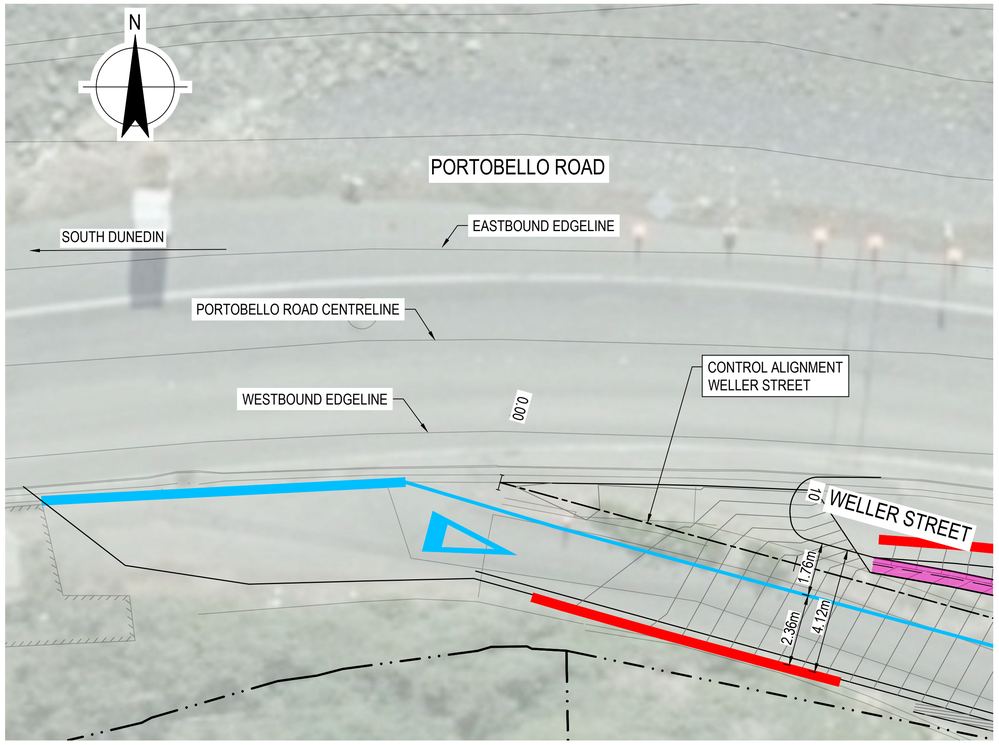
Size A1

Drawing No. 12537363-C010

Rev A

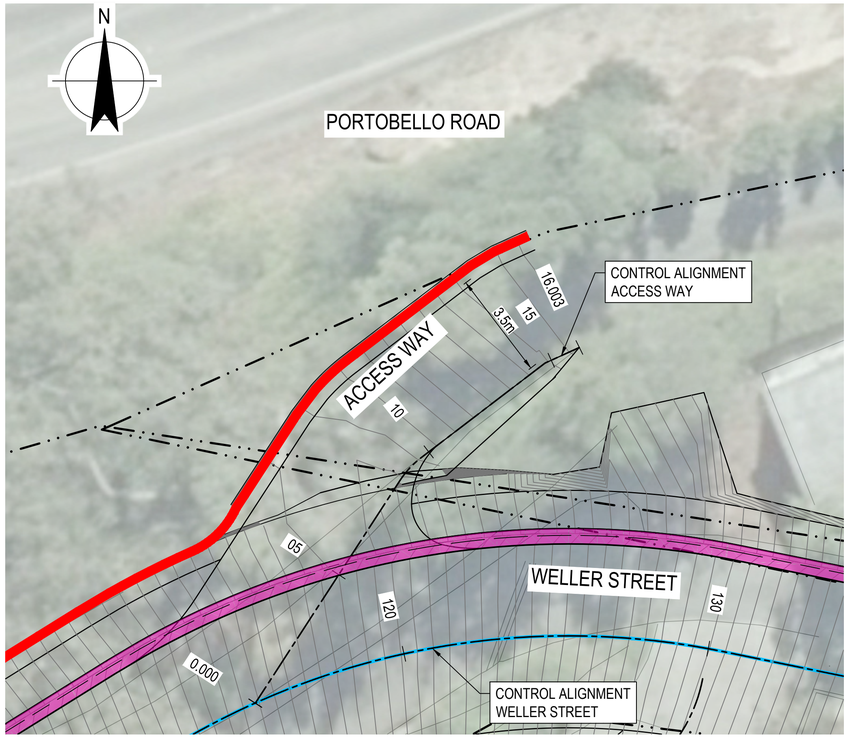
Plot Date: 15 February 2022 - 11:50 AM Plotted by: Brian Rai

File Name: C:\12d\SW\data\P-00-12D-001\51-12537363 - Weller Street Realignment Design_1741\CADD\Drawings\12537363-C010.dwg



LAYOUT PLAN AT PORTOBELLO ROAD INTERSECTION

SCALE 1:100



LAYOUT PLAN AT ACCESS WAY INTERSECTION

SCALE 1:100

LEGEND - EXISTING

- LEGAL BOUNDARY LINE
- PROPERTY ADDRESS
- EDGE OF SEAL
- FENCES
- BUILDING
- TREES
- STREET LIGHTS, POWER POLES, TELECOM POLE
- ROAD SIGNS
- SUMPS, MANHOLES
- SURVEY MARKS
- HYDRANTS, WATER METER
- LETTERBOX, RUBBISH BIN

LEGEND - PROPOSED

- CONTROL ALIGNMENT AND CHAINAGE (100)
- RETAINING WALL
- KERB AND CHANNEL
- EDGE OF SEAL
- 100mm WIDE SOLID WHITE LINE
- 300mm WIDE SOLID WHITE LIMIT LINE
- GIVEWAY SYMBOL

NOTE:

1. REFER TO DRAWINGS 12537363-C052 AND 12537363-C054 FOR CROSS SECTIONS AT THESE CHAINAGES.

Rev	Description	Checked	Approved	Date
A	PRELIMINARY - CONCEPT DESIGN	GR*	DM*	15.02.22

Author B. RAJ **Drafting Check** G. DOUGHERTY*

Designer P. KITTO **Design Check** R. STEENKAMP*

0 1 2 3 4 5m

SCALE 1:100 AT ORIGINAL SIZE

GTJM PROPERTY LTD

terramark setting new boundaries

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GHD Limited

Project No. 12537363

Client GTJM PROPERTY LTD

Project WELLER STREET - CONCEPT DESIGN

Status PRELIMIANRY Status Code S2

Drawing Title LAYOUT PLANS

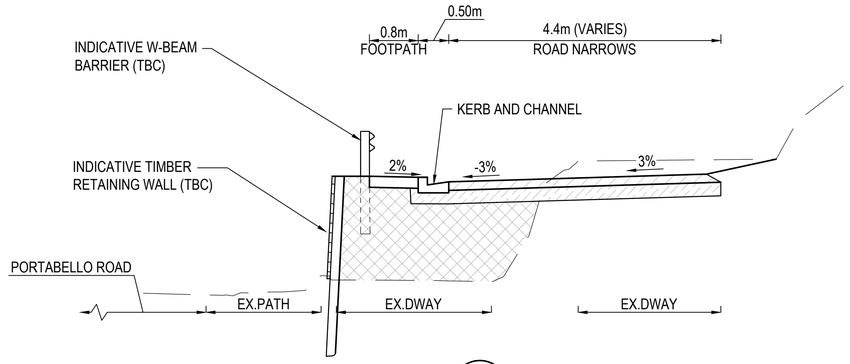
Size A1

Drawing No. 12537363-C011

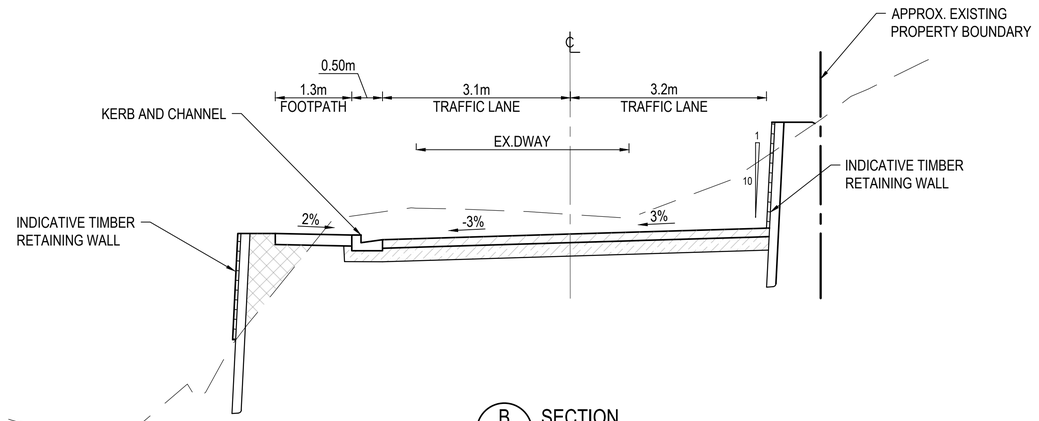
Rev A

Plot Date: 15 February 2022 - 11:50 AM Plotted by: Brian Raj

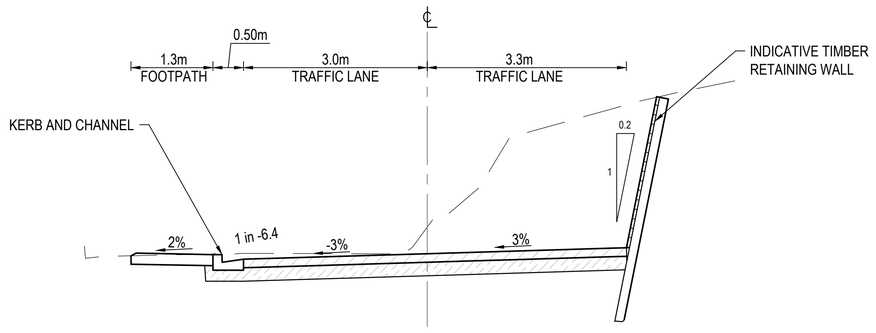
File Name: C:\12d\SW\data\P-00-12D-001\51-12537363 - Weller Street Realignment Design_1741\CADD\Drawings\12537363-C010.dwg



A SECTION
C011 SCALE 1 : 50



B SECTION
C011 SCALE 1 : 50



C SECTION
C011 SCALE 1 : 50

Rev	Description	Checked	Approved	Date
A	PRELIMINARY - CONCEPT DESIGN	GR*	DM*	15.02.22

Author B. RAJ **Drafting Check** G. DOUGHERTY*
Designer P. KITTO **Design Check** R. STEENKAMP*

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

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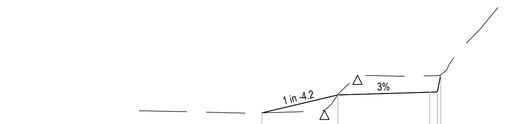
Project No. 12537363

Client GTJM PROPERTY LTD
Project WELLER STREET - CONCEPT DESIGN
Status PRELIMINARY Status Code S2

Drawing Title TYPICAL SECTIONS
Size A1
Drawing No. 12537363-C020
Rev A

Plot Date: 15 February 2022 - 12:50 PM Plotted by: Brian Raj
File Name: C:\12d\SW\data\P-00-12D-001\51-12537363 - Weller Street Realignment Design_1741\CADD\Drawings\12537363-C020.dwg



LEGEND	
△	EXISTING DRIVEWAY EDGES

DATUM R.L. 2.00

DESIGN SURFACE LEVEL	3.081	3.665	3.665	3.755	3.763	4.334
DEPTH CUT - / FILL +	0	-0.01	-0.01	-0.54	-0.53	0
EXISTING SURFACE LEVEL	3.08	3.68	3.68	4.29	4.29	4.33
OFFSET FROM CENTRELINE	-2.48	0	0	3	3.25	3.36

CH 10

DATUM R.L. 2.00

DESIGN SURFACE LEVEL	3.093	3.164	3.254	3.262	3.866
DEPTH CUT - / FILL +	0	-0.08	-0.61	-0.6	0
EXISTING SURFACE LEVEL	3.09	3.24	3.86	3.87	3.87
OFFSET FROM CENTRELINE	-1.3	0	3	3.25	3.37

CH 5

DATUM R.L. 2.00

DESIGN SURFACE LEVEL	3.103	3.193	3.2	3.464
DEPTH CUT - / FILL +	-0	-0.25	-0.24	0
EXISTING SURFACE LEVEL	3.11	3.44	3.44	3.46
OFFSET FROM CENTRELINE	0	3	3.25	3.78

CH 0

APPROX. GARAGE LOCATION

DATUM R.L. 2.00

DESIGN SURFACE LEVEL	3.054	5.89	5.89	5.869	5.869	5.739	5.794	5.831	5.831	5.878
DEPTH CUT - / FILL +	0.01	2.84	2.39	1.64	1.65	1.52	1.58	1.68	1.68	
EXISTING SURFACE LEVEL	3.04	3.05	3.5	4.23	4.22	4.22	4.21	4.15	4.15	
OFFSET FROM CENTRELINE	-3.53	-3.39	-2.78	-1.73	-1.58	-1.58	-1.23	0	0	1.57

CH 35

DATUM R.L. 2.00

DESIGN SURFACE LEVEL	3.028	5.792	5.792	5.771	5.771	5.641	5.696	5.73	5.73	5.783	5.998
DEPTH CUT - / FILL +	-0	2.75	2.24	1.93	1.93	1.8	1.86	1.9	1.9	-0.19	0
EXISTING SURFACE LEVEL	3.03	3.04	3.55	3.84	3.84	3.84	3.84	3.83	3.83	5.97	6
OFFSET FROM CENTRELINE	-3.45	-3.31	-2.7	-1.65	-1.5	-1.5	-1.15	0	0	1.76	1.97

CH 30

DATUM R.L. 2.00

DESIGN SURFACE LEVEL	3.326	4.963	4.963	4.947	4.947	4.817	4.872	4.9	4.9	4.99	4.998	5.234
DEPTH CUT - / FILL +	-0.01	1.69	1.69	1.68	1.68	1.55	1.62	1.48	1.48	-0.24	-0.23	0
EXISTING SURFACE LEVEL	3.34	3.27	3.27	3.26	3.26	3.26	3.26	3.42	3.42	5.23	5.23	5.23
OFFSET FROM CENTRELINE	-2.94	-2.86	-2.25	-1.45	-1.31	-1.3	-0.95	0	0	3	3.25	3.49

CH 20

DATUM R.L. 2.00

DESIGN SURFACE LEVEL	3.745	6.234	6.234	6.209	6.209	6.079	6.134	6.217	6.3	6.308	7.826	7.826	7.703
DEPTH CUT - / FILL +	0.27	2.62	1.91	0.64	0.51	0.38	0.24	0.22	-0.77	-0.96	0.42	0.26	0
EXISTING SURFACE LEVEL	3.47	3.62	4.32	5.57	5.7	5.7	5.9	6	7.07	7.27	7.4	7.57	7.7
OFFSET FROM CENTRELINE	-5.25	-5.13	-4.52	-3.27	-3.12	-3.12	-2.77	0	2.75	3	3.08	3.69	3.93

CH 60

DATUM R.L. 2.00

DESIGN SURFACE LEVEL	3.312	6.124	6.124	6.099	6.099	5.969	6.024	6.068	6.068	6.132	6.139	7.408	7.408	7.213
DEPTH CUT - / FILL +	0.01	2.8	2.8	1.22	0.91	0.77	0.65	0.69	0.69	0.57	-0.78	0.47	0.31	0
EXISTING SURFACE LEVEL	3.3	3.32	3.32	4.88	5.19	5.2	5.38	5.38	5.38	5.56	6.92	6.93	7.1	7.21
OFFSET FROM CENTRELINE	-3.96	-3.82	-3.21	-1.96	-1.81	-1.81	-1.46	0	0	2.12	2.37	2.43	3.04	3.44

CH 50

DATUM R.L. 2.00

DESIGN SURFACE LEVEL	3.112	5.984	5.984	5.961	5.961	5.831	5.886	5.919	5.919	5.964	5.971	6.277
DEPTH CUT - / FILL +	-0.01	2.86	2.21	1.35	1.35	1.22	1.29	1.34	1.34	0.83	-0.19	0
EXISTING SURFACE LEVEL	3.12	3.13	3.78	4.61	4.61	4.61	4.6	4.58	4.58	5.13	6.16	6.28
OFFSET FROM CENTRELINE	-3.48	-3.33	-2.72	-1.6	-1.45	-1.45	-1.1	0	0	1.49	1.74	2.04

CH 40

CROSS SECTIONS - WELLER STREET

Rev	Description	Checked	Approved	Date
A	PRELIMINARY - CONCEPT DESIGN	GR*	DM*	15.02.22

Author B. RAJ **Drafting Check** G. DOUGHERTY*
Designer P. KITTO **Design Check** R. STEENKAMP*

SCALE 1:100 AT ORIGINAL SIZE

GTJM
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GHD Limited

Project No. 12537363

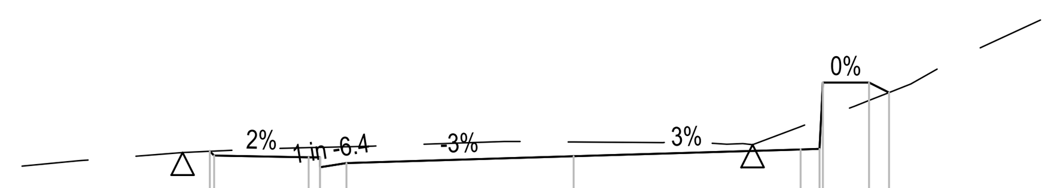
Client GTJM PROPERTY LTD
Project WELLER STREET - CONCEPT DESIGN
Status PRELIMINARY
Status Code S2

Drawing Title CROSS SECTIONS
SHEET 1 OF 4

Size A1
Drawing No. 12537363-C051
Rev A

Plot Date: 15 February 2022 - 11:47 AM Plotted by: Brian Raj
File Name: C:\12d\SW\data\P-00-12D-001\51-12537363 - Weller Street Realignment Design_1741\CADD\Drawings\12537363-C050.dwg

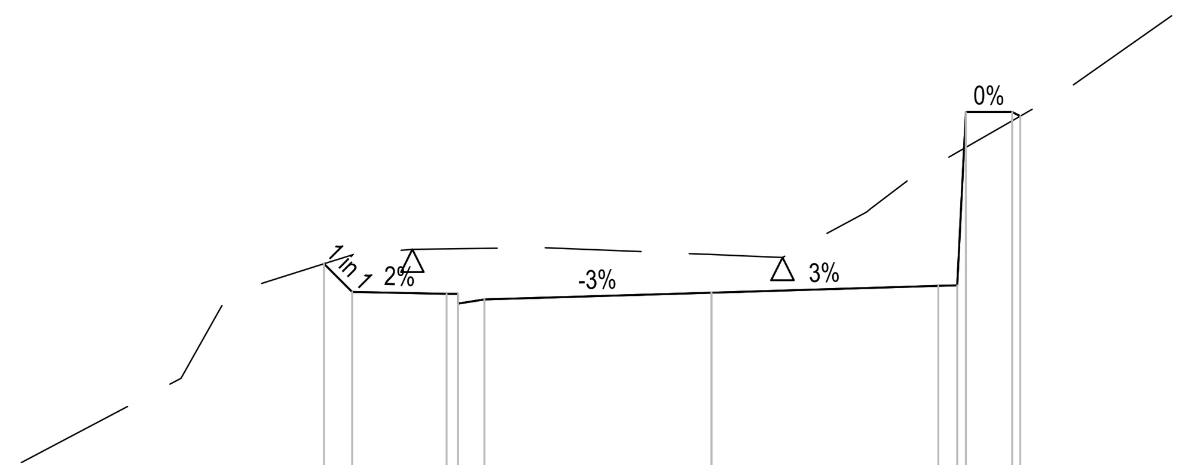
LEGEND
△ EXISTING DRIVEWAY EDGES



DATUM R.L. 7.00

DESIGN SURFACE LEVEL	8.005	7.949	7.924	7.924	7.794	7.849	7.939	8.029	8.037	8.915	8.915	8.782
DEPTH CUT - / FILL +	0	-0.06	-0.13	-0.13	-0.26	-0.22	-0.19	-0.3	-0.39	0.47	0.24	0
EXISTING SURFACE LEVEL	8.01	8.01	8.05	8.06	8.06	8.07	8.13	8.33	8.43	8.44	8.68	8.78
OFFSET FROM CENTRELINE	-4.81	-4.75	-3.5	-3.35	-3.35	-3	0	3	3.25	3.29	3.9	4.17

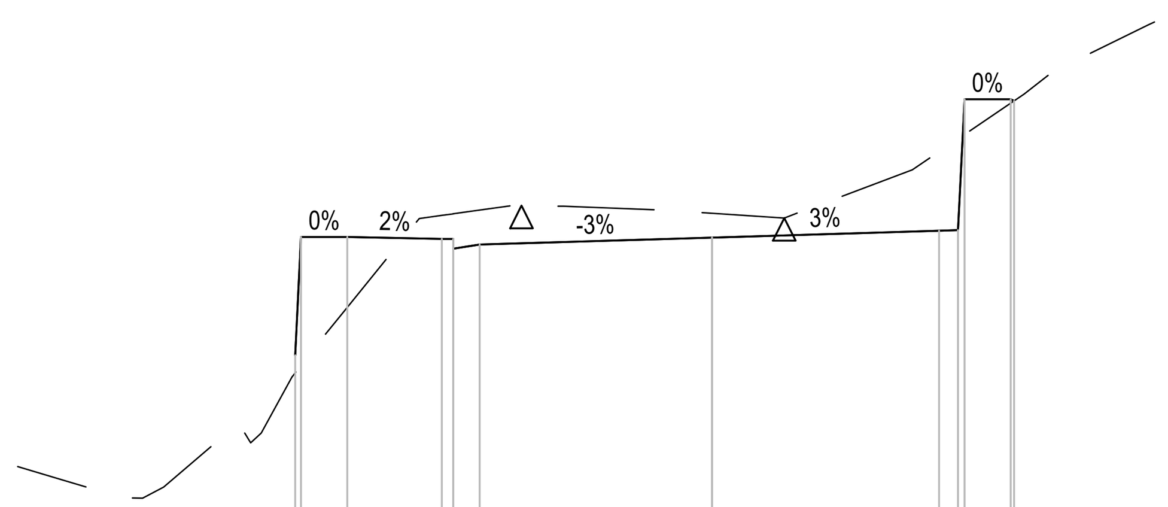
CH 90



DATUM R.L. 3.00

DESIGN SURFACE LEVEL	7.36	6.987	6.962	6.962	6.832	6.887	6.977	6.977	7.067	7.075	9.367	9.367	9.312
DEPTH CUT - / FILL +	0	-0.49	-0.59	-0.6	-0.73	-0.68	-0.5	-0.5	-1.62	-1.76	0.47	0.12	0
EXISTING SURFACE LEVEL	7.36	7.48	7.56	7.56	7.56	7.56	7.48	7.48	8.69	8.83	8.9	9.25	9.31
OFFSET FROM CENTRELINE	-5.12	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.36	3.97	4.08

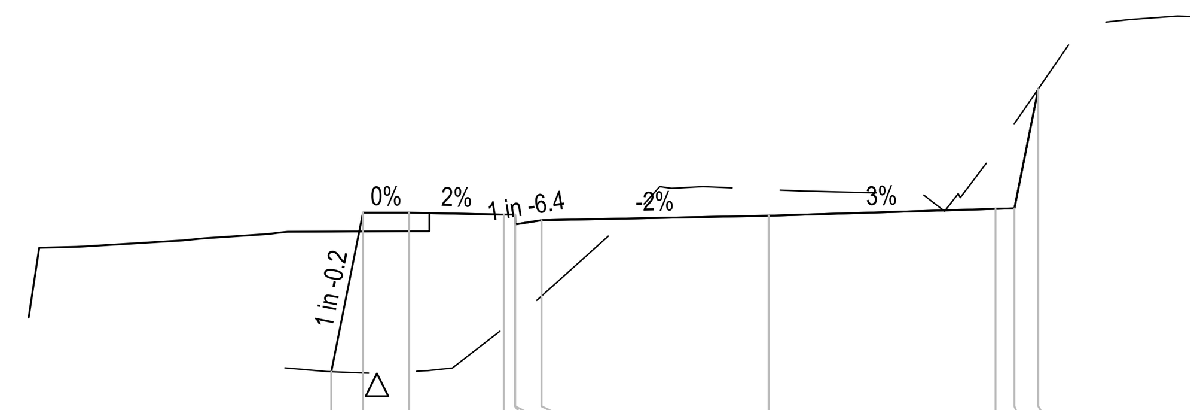
CH 80



DATUM R.L. 2.00

DESIGN SURFACE LEVEL	4.944	6.506	6.506	6.481	6.481	6.351	6.406	6.498	6.498	6.588	6.596	8.324	8.324	8.302
DEPTH CUT - / FILL +	0.23	1.69	0.93	-0.31	-0.33	-0.46	-0.45	-0.32	-0.32	-1.04	-1.21	0.46	0.06	0
EXISTING SURFACE LEVEL	4.71	4.81	5.58	6.79	6.81	6.81	6.86	6.82	6.82	7.63	7.8	7.86	8.27	8.3
OFFSET FROM CENTRELINE	-5.51	-5.43	-4.82	-3.57	-3.42	-3.42	-3.07	0	0	3	3.25	3.34	3.95	3.99

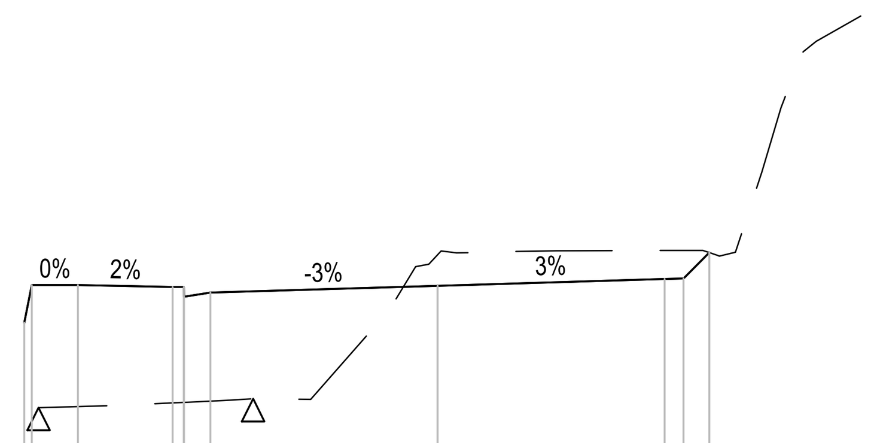
CH 70



DATUM R.L. 10.00

DESIGN SURFACE LEVEL	10.967	13.058	13.058	13.033	13.033	12.903	12.958	13.018	13.108	13.115	14.691
DEPTH CUT - / FILL +	-0	2.12	2.1	1.5	1.38	1.25	1	-0.35	-0.76	-1.12	0
EXISTING SURFACE LEVEL	10.96	10.94	10.96	11.53	11.65	11.65	11.96	13.36	13.87	14.23	14.69
OFFSET FROM CENTRELINE	-5.78	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	3	3.25	3.57

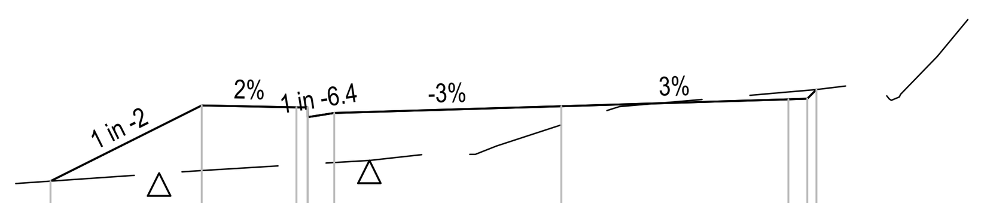
CH 120



DATUM R.L. 8.00

DESIGN SURFACE LEVEL	10.703	11.203	11.203	11.178	11.178	11.048	11.103	11.193	11.193	11.283	11.29	11.632
DEPTH CUT - / FILL +			1.61	1.53	1.53	1.4	1.43	-0.41	-0.41	-0.38	-0.37	0
EXISTING SURFACE LEVEL			9.6	9.64	9.65	9.65	9.67	11.6	11.6	11.66	11.66	11.63
OFFSET FROM CENTRELINE	-5.46	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.59

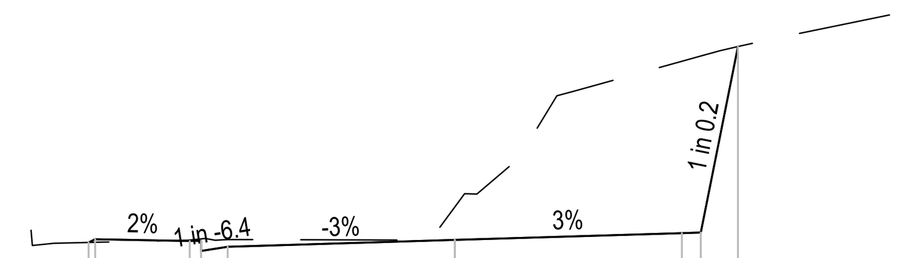
CH 110



DATUM R.L. 7.00

DESIGN SURFACE LEVEL	8.411	9.411	9.386	9.386	9.256	9.311	9.401	9.401	9.491	9.498	9.619
DEPTH CUT - / FILL +	0	0.86	0.76	0.75	0.62	0.65	0.25	0.25	-0.1	-0.11	0
EXISTING SURFACE LEVEL	8.41	8.55	8.63	8.63	8.63	8.66	9.15	9.15	9.59	9.61	9.62
OFFSET FROM CENTRELINE	-6.75	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.37

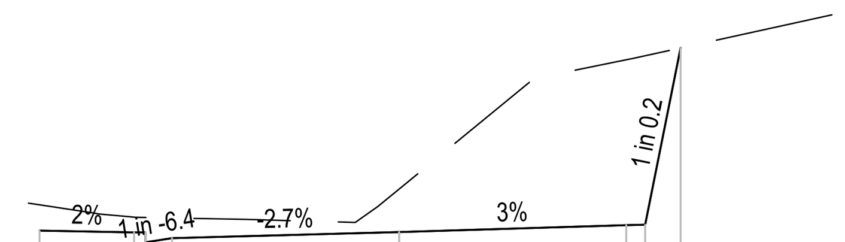
CH 100



DATUM R.L. 17.00

DESIGN SURFACE LEVEL	18.659	18.703	18.678	18.678	18.548	18.603	18.693	18.693	18.783	18.79	21.245
DEPTH CUT - / FILL +	0	0.04	-0.01	-0.03	-0.16	-0.1	-0.43	-0.43	-2.27	-2.33	0
EXISTING SURFACE LEVEL	18.66	18.66	18.69	18.71	18.71	18.7	19.13	19.13	21.05	21.12	21.25
OFFSET FROM CENTRELINE	-4.84	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.74

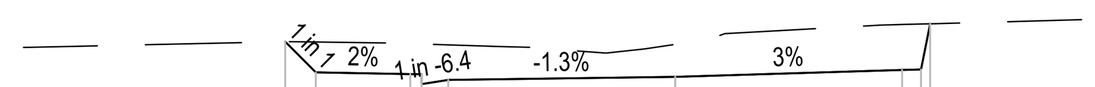
CH 150



DATUM R.L. 15.00

DESIGN SURFACE LEVEL	16.813	16.788	16.788	16.658	16.713	16.793	16.793	16.883	16.89	19.221
DEPTH CUT - / FILL +	-0.34	-0.2	-0.2	-0.33	-0.27	-0.57	-0.57	-2.18	-2.23	0
EXISTING SURFACE LEVEL	17.15	16.99	16.99	16.99	16.98	17.36	17.36	19.07	19.12	19.22
OFFSET FROM CENTRELINE	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.72

CH 140



DATUM R.L. 14.00

DESIGN SURFACE LEVEL	15.357	14.953	14.928	14.928	14.798	14.853	14.893	14.893	14.983	14.99	15.592
DEPTH CUT - / FILL +	0	-0.4	-0.4	-0.4	-0.53	-0.46	-0.43	-0.43	-0.6	-0.6	0
EXISTING SURFACE LEVEL	15.36	15.35	15.33	15.33	15.33	15.31	15.32	15.32	15.58	15.59	15.59
OFFSET FROM CENTRELINE	-5.15	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.37

CH 130

CROSS SECTIONS - WELLER STREET

Rev	Description	Checked	Approved	Date
A	PRELIMINARY - CONCEPT DESIGN	GR*	DM*	15.02.22

Author B. RAJ — Drafting Check G. DOUGHERTY*
Designer P. KITTO — Design Check R. STEENKAMP*

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

GTJM PROPERTY LTD

terramark — setting new boundaries

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GHD Limited

www.ghd.com

Project No. 12537363

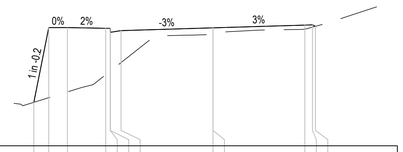
Client: GTJM PROPERTY LTD
Project: WELLER STREET - CONCEPT DESIGN
Status: PRELIMINARY — Status Code S2

Drawing Title: CROSS SECTIONS SHEET 2 OF 4

Size A1
Drawing No. 12537363-C052
Rev A

Plot Date: 15 February 2022 - 11:47 AM Plotted by: Brian Raj
File Name: C:\12d\SW\data\P-00-12D-001\51-12537363 - Weller Street Realignment Design_1741\CADD\Drawings\12537363-C050.dwg

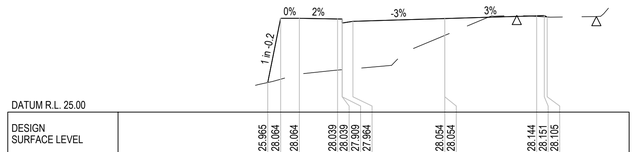
LEGEND	
△	EXISTING DRIVEWAY EDGES



DATUM R.L. 20.00

DESIGN SURFACE LEVEL	21.418	23.859	23.859	23.834	23.834	23.704	23.759	23.849	23.849	23.939	23.946	23.999											
DEPTH CUT - / FILL +	0	2.29	2.1	1.51	1.4	1.27	1.04	0.18	0.18	0.13	0.07	0											
EXISTING SURFACE LEVEL	21.42	21.57	21.76	22.32	22.44	22.44	22.72	23.67	23.67	23.81	23.87	23.9											
OFFSET FROM CENTRELINE	-5.85	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.35											

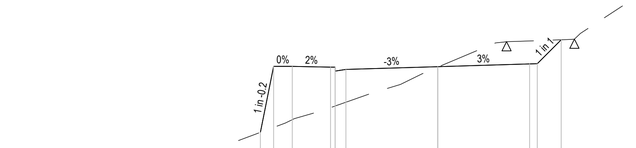
CH 180



DATUM R.L. 25.00

DESIGN SURFACE LEVEL	25.965	28.064	28.064	28.039	28.039	27.909	27.964	28.054	28.054	28.144	28.151	28.105											
DEPTH CUT - / FILL +	0	1.99	1.82	1.67	1.65	1.52	1.55	0.55	0.55	0.02	0.04	0											
EXISTING SURFACE LEVEL	25.97	26.07	26.24	26.37	26.38	26.38	26.42	27.5	27.5	28.12	28.11	28.11											
OFFSET FROM CENTRELINE	-5.78	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.34											

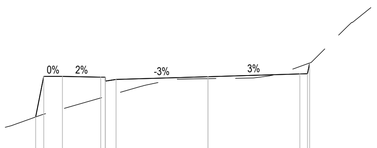
CH 210



DATUM R.L. 28.00

DESIGN SURFACE LEVEL	29.687	31.841	31.841	31.816	31.816	31.686	31.741	31.831	31.831	31.921	31.928	32.71											
DEPTH CUT - / FILL +	0	1.99	1.74	1.32	1.27	1.14	1.07	0.02	0.02	-0.75	-0.75	0											
EXISTING SURFACE LEVEL	29.69	29.85	30.1	30.49	30.55	30.55	30.67	31.82	31.82	32.67	32.68	32.71											
OFFSET FROM CENTRELINE	-5.79	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	4.03											

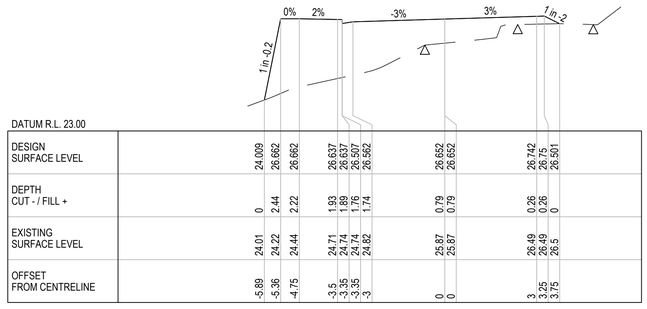
CH 240



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	20.932	22.256	22.256	22.231	22.231	22.101	22.156	22.246	22.246	22.336	22.343	22.395											
DEPTH CUT - / FILL +	0	1.23	1.06	0.68	0.63	0.5	0.46	0.06	0.06	-0.24	-0.33	0											
EXISTING SURFACE LEVEL	20.93	21.02	21.2	21.55	21.6	21.6	21.7	22.18	22.18	22.58	22.67	22.69											
OFFSET FROM CENTRELINE	-5.62	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.32											

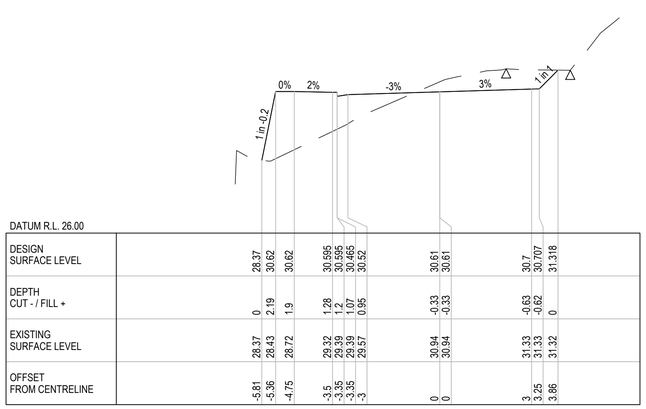
CH 170



DATUM R.L. 23.00

DESIGN SURFACE LEVEL	24.009	26.662	26.662	26.637	26.637	26.507	26.562	26.652	26.652	26.742	26.775	26.501											
DEPTH CUT - / FILL +	0	2.44	2.22	1.93	1.89	1.76	1.74	0.79	0.79	0.26	0.26	0											
EXISTING SURFACE LEVEL	24.01	24.22	24.44	24.71	24.74	24.74	24.82	25.87	25.87	26.49	26.49	26.5											
OFFSET FROM CENTRELINE	-5.89	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.75											

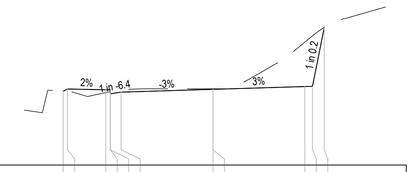
CH 200



DATUM R.L. 26.00

DESIGN SURFACE LEVEL	28.37	30.62	30.62	30.595	30.595	30.465	30.52	30.61	30.61	30.7	30.707	31.318											
DEPTH CUT - / FILL +	0	2.19	1.9	1.28	1.2	1.07	0.95	-0.33	-0.33	-0.63	-0.62	0											
EXISTING SURFACE LEVEL	28.37	28.43	28.72	29.32	29.39	29.39	29.57	30.94	30.94	31.33	31.33	31.32											
OFFSET FROM CENTRELINE	-5.81	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.86											

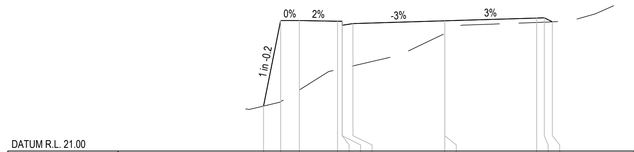
CH 230



DATUM R.L. 18.00

DESIGN SURFACE LEVEL	20.41	20.481	20.466	20.466	20.326	20.381	20.471	20.471	20.561	20.568	20.469												
DEPTH CUT - / FILL +	0	0.08	0.09	0.06	-0.07	-0.09	-0.02	-0.02	-1.45	-1.65	0												
EXISTING SURFACE LEVEL	20.41	20.4	20.36	20.4	20.4	20.47	20.49	20.49	22.01	22.22	22.5												
OFFSET FROM CENTRELINE	-4.89	-4.75	-3.5	-3.35	-3.35	-3	0	0	3.25	3.64													

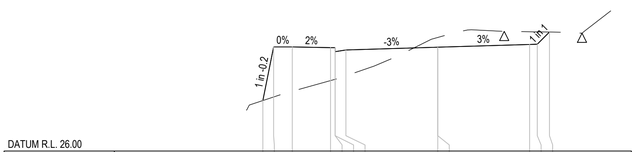
CH 160



DATUM R.L. 21.00

DESIGN SURFACE LEVEL	22.467	25.261	25.261	25.236	25.236	25.106	25.161	25.251	25.251	25.341	25.348	25.218											
DEPTH CUT - / FILL +	0	2.65	2.27	1.57	1.54	1.41	1.38	0.41	0.41	0.14	0.14	0											
EXISTING SURFACE LEVEL	22.47	22.61	22.99	23.66	23.7	23.7	23.78	24.84	24.84	25.2	25.21	25.22											
OFFSET FROM CENTRELINE	-5.92	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.51											

CH 190



DATUM R.L. 26.00

DESIGN SURFACE LEVEL	27.648	29.399	29.399	29.374	29.374	29.244	29.299	29.389	29.389	29.479	29.486	29.884											
DEPTH CUT - / FILL +	0	1.64	1.45	1.07	1.03	0.9	0.84	-0.32	-0.32	-0.41	-0.4	0											
EXISTING SURFACE LEVEL	27.65	27.76	27.95	28.3	28.34	28.34	28.45	29.71	29.71	29.89	29.89	29.88											
OFFSET FROM CENTRELINE	-5.71	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	3.65											

CH 220

CROSS SECTIONS - WELLER STREET

Rev	Description	Checked	Approved	Date
A	PRELIMINARY - CONCEPT DESIGN	GR*	DM*	15.02.22

Author B. RAJ **Drafting Check** G. DOUGHERTY*

Designer P. KITTO **Design Check** R. STEENKAMP*

0 1 2 3 4 5m

SCALE 1:100 AT ORIGINAL SIZE

GTJM PROPERTY LTD

terramark
setting new boundaries

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GHD Limited

Project No. 12537363

Client GTJM PROPERTY LTD

Project WELLER STREET - CONCEPT DESIGN

Status PRELIMINARY Status Code S2

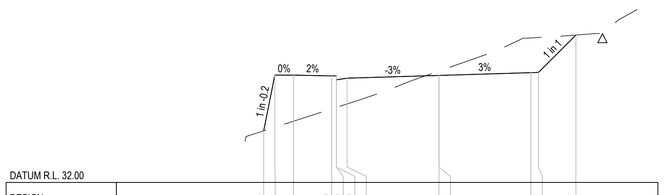
Drawing Title CROSS SECTIONS SHEET 3 OF 4

Size A1

Drawing No. 12537363-C053 Rev A

Plot Date: 15 February 2022 - 11:47 AM Plotted by: Brian Rai

File Name: C:\12d\SW\data\P-00-12D-001\51-12537363 - Weller Street Realignment Design_1741\CADD\Drawings\12537363-C050.dwg



LEGEND	
△	EXISTING DRIVEWAY EDGES

CROSS SECTIONS - WELLER STREET

DATUM R.L. 32.00

DESIGN SURFACE LEVEL	33.685	35.504	35.504	35.479	35.479	35.349	35.404	35.494	35.494	35.584	35.592	36.812
DEPTH CUT - / FILL +	0	1.7	1.51	1.08	1.03	0.9	0.84	-0.14	-0.14	-1.13	-1.14	0
EXISTING SURFACE LEVEL	33.68	33.8	34	34.4	34.45	34.45	34.56	35.64	35.64	36.72	36.73	36.81
OFFSET FROM CENTRELINE	-5.72	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	4.47

CH 270

DATUM R.L. 31.00

DESIGN SURFACE LEVEL	32.415	34.283	34.283	34.258	34.258	34.128	34.183	34.273	34.273	34.363	34.371	35.481
DEPTH CUT - / FILL +	0	1.76	1.57	1.14	1.08	0.95	0.89	-0.15	-0.15	-1.11	-1.11	0
EXISTING SURFACE LEVEL	32.41	32.53	32.71	33.12	33.17	33.18	33.3	34.43	34.43	35.48	35.48	35.48
OFFSET FROM CENTRELINE	-5.73	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	4.36

CH 260

DATUM R.L. 29.00

DESIGN SURFACE LEVEL	30.943	33.062	33.062	33.037	33.037	32.907	32.962	33.052	33.052	33.142	33.15	34.129
DEPTH CUT - / FILL +	0	1.98	1.77	1.32	1.27	1.13	1.06	0.05	0.05	-0.94	-0.94	0
EXISTING SURFACE LEVEL	30.94	31.09	31.29	31.72	31.77	31.77	31.9	33	33	34.08	34.09	34.13
OFFSET FROM CENTRELINE	-5.78	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	4.23

CH 250

DATUM R.L. 33.00

DESIGN SURFACE LEVEL	34.352	36.004	36.004	35.979	35.979	35.849	35.904	35.994	35.994	36.084	36.091	37.843
DEPTH CUT - / FILL +	0	1.56	1.37	0.97	0.92	0.79	0.74	-0.08	-0.08	-1.23	-1.35	0
EXISTING SURFACE LEVEL	34.35	34.45	34.63	35.01	35.06	35.06	35.16	36.08	36.08	37.32	37.44	37.84
OFFSET FROM CENTRELINE	-5.69	-5.36	-4.75	-3.5	-3.35	-3.35	-3	0	0	3	3.25	5

CH 280

CROSS SECTIONS - ACCESS WAY

DATUM R.L. 10.00

DESIGN SURFACE LEVEL	11.479	11.879	11.879	11.984	12.032
DEPTH CUT - / FILL +				0.25	0
EXISTING SURFACE LEVEL				11.73	12.03
OFFSET FROM CENTRELINE	-4.2	-4	-3.5	0	0.48

CH 15

DATUM R.L. 10.00

DESIGN SURFACE LEVEL	11.177	12.538	12.538	12.643	12.74
DEPTH CUT - / FILL +				1.47	1.02
EXISTING SURFACE LEVEL				11.18	11.72
OFFSET FROM CENTRELINE	-4.2	-4	-3.5	0	0.97

CH 10

DATUM R.L. 9.00

DESIGN SURFACE LEVEL	10.68	12.606	12.606	12.711
DEPTH CUT - / FILL +				1.63
EXISTING SURFACE LEVEL				11.08
OFFSET FROM CENTRELINE	-4.2	-4	-3.5	0

CH 5

Rev	Description	Checked	Approved	Date
A	PRELIMINARY - CONCEPT DESIGN	GR*	DM*	15.02.22

Author B. RAJ **Drafting Check** G. DOUGHERTY*
Designer P. KITTO **Design Check** R. STEENKAMP*

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

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GHD Limited

Project No. 12537363

Client GTJM PROPERTY LTD
Project WELLER STREET - CONCEPT DESIGN
Status PRELIMINARY
Status Code S2

Drawing Title CROSS SECTIONS
SHEET 4 OF 4

Size A1
Drawing No. 12537363-C054
Rev A

Plot Date: 15 February 2022 - 11:47 AM Plotted by: Brian Rai
File Name: C:\12d\SW\data\P-00-12D-001\51-12537363 - Weller Street Realignment Design_1741\CADD\Drawings\12537363-C050.dwg

Technical Memorandum

February 22, 2022

To	Joe Morrison	**Tel**	
Copy to	Doug Palmer, Grace Ryan	**Email**	riaan.steenkamp@ghd.com
From	Riaan Steenkamp	**Ref. No.**	12537363
Subject	Weller Street Concept Design		

1. Introduction

Following the submission of the Integrated Transport Assessment (ITA) of Weller Street for GTJM Property Limited on 6 December 2021, this Technical Memorandum offers design criteria achieved during the preparation of the concept design development of Weller Street, for the purposes of providing a rebuilt intersection on Portobello Road and a road connection to the proposed residential development. The intention of this concept design is to inform discussion with DCC regarding the access arrangement, future road safety audits, site investigations which forms the basis of the next design stage.

For the purposes of a concise record, the existing access arrangement and site constraints discussed in the above prior assessment should be referred to with this Technical Memorandum.

2. ITA Recommendations

The ITA assessment recorded initial recommendations for the Weller Street improvements, and these have been referenced in the table below, together with commentary on how these recommendations have been addressed in the concept design.

Technical Memorandum

Table 1 ITA Recommendation Development to Concept Design

No	ITA Recommendation	Concept Design
1	Local widening on Weller Street approach at the intersection to accommodate two-way vehicle access and ease turning movements. This area should be regraded to provide a flatter manoeuvring area and allow longitudinal drainage along Portobello Road.	Achieved. The existing combined wide intersection of Weller Street and the private access onto Portobello Road has been reconfigured to a single entry way to avoid confusion and aide with the vertical tie in. The horizontal placement of the intersection is at its existing location and due to the site constraints, a bi-directional roadway cross section on Weller Street is achieved over a short distance. The roadway just beyond the intersection is just over four metres wide. A smooth intersection rounding onto Portobello Road has been achieved with a 0.5% grade over a short distance
2	'Concealed exit' permanent warning sign (PW-26) for westbound traffic approaching the intersection on Portobello Road	To be confirmed with DCC during the next design stage.
3	The Minimum Gap Sight Distance requirements should be achieved in the intersection design, especially the 83 m for right turns from Weller Street to Portobello Road (currently not achieved). Achieving the 123 m Safe Intersection Sight Distance is ideal if practical. The design should not worsen sight distance from the existing.	Partially Achieved. The Minimum Gap Sight Distance to the east is considered achieved, depending on the treatment on top of the retaining wall and the termination of the roadside barrier (if implemented). At this stage of the design, it is assumed that the motorist would have a clear line of sight to the east over the retaining wall and the roadside barrier end treatment. Further, the improvement of this requirement from the ITA to this concept design is the angle of Weller Street onto Portobello Road, aiding the motorists sight line. As mentioned in the ITA, the 123 m Safe Intersection Sight Distance would be ideal if achievable, however due to the existing site constraints, this is not achievable, but the proposed layout has not made the existing any worse than it's current form.
4	Flag lighting could be installed at bus stops on Weller Street that are not currently lit by carriageway lighting, however no lighting was installed by the Peninsula Connection project for the new westbound bus stop at Weller Street. There may be further safety benefit for flag lighting at or near this intersection and this could be raised in discussions with DCC	To be confirmed with DCC during the next design stage.

No	ITA Recommendation	Concept Design
5	Reconstruction of Weller Street to include new pavement structure and surfacing, with associated retaining and landscaping works as required	Details to be confirmed during the next design stage.
6	Fire appliance access to be accommodated at the intersection and along Weller Street to the proposed turning head. This is considered to apply only for the turn movements from / to Dunedin.	Achieved. Tracking exercise has been undertaken during the concept design phase for a Fire appliance.
7	The cross section is assumed to be a 6 m wide carriageway and is recommended to generally allow two-way traffic flow. At constrained locations this width may be narrower to one-way flow, where: a. sight distance should be provided to allow drivers to anticipate conflicts at 30 km/h. b. clear width of at least 6 m should be provided to allow drivers to pull over to let other users pass and appropriately deal with constraints.	Partially Achieved. The typical cross sections are shown on dwg 1253736-C020. The corridor constraints from CH10 to CH60 require a one way operation to navigate this portion of the alignment and for the remainder of the alignment, a six metre wide roadway is provided. The roadway width at the constrained location is 3.3 m wide. Note that the constraint is the private property (Site 333) and Portobello Road Corridor.
8	The cross section should allow for a single 2 m path, given the potentially slow uphill speed of pedestrian and cyclist users which would conflict with vehicle users.	Not achieved. Due to the steep topography, Portobello Road Corridor and high envisaged retaining walls, a 1.3 m wide footpath has been achieved, narrowing to 0.8 m at the constrained section. It should be noted that a safety fence or roadside barrier will have to be provided at the retaining wall locations for fall protection.
9	While a 16% maximum gradient is allowed, a 10% target maximum gradient is recommended where practical, to mitigate the effects of steeper grades for cyclists or mobility devices	Not achieved. Due to the topography and adjacent land use, this maximum permissible grade has been exceeded over very short sections, with a 19% grade over 20 m. This section of the alignment matches the existing and cannot be improved without excessive earthworks and retaining walls with minimal overall benefit.

Technical Memorandum

3. Standards Referenced

The key standards and guidelines that were used as reference in the concept design development, as appropriate are listed below.

– Waka Kotahi (Transit) State Highway Geometric Design Manual (Draft), 2000. (SHGDM)
– Austroads Guide to Road Design (Parts 3 and 4A) 2021. (AGRD)
– Dunedin District Council, Dunedin Code of Subdivision and Development - August 2010
– NZS 4404:2010 Land development and subdivision infrastructure
– Waka Kotahi Pedestrian Planning and Design Guide
– Land Transport NZ Road and Traffic Standards RTS18, New Zealand on-road tracking curves for heavy motor vehicles, 2007.
– Waka Kotahi RTS14 Guidelines for facilities for blind and vision impaired pedestrians, 2015
– Waka Kotahi Planning Policy Manual, 2007. (PPM)

Note that some of these standards may not be met due to various site constraints but these represent design intent. Standards of safety will take priority.

4. Intersection

The outcomes of the intersection layout achieve a single point entry and exit configuration off Portobello Road and eliminates the confusing dual existing configuration. This improved layout will aide a safer entry and exit manoeuvre from Weller Street onto Portobello Road.

There is sufficient space at the intersection for a single car to wait out of the way of the Portobello Road traffic lane and to allow traffic to exit off Weller Street (an improvement of the existing situation). Some alignment refinement may allow the adjacent walls to be pushed out to the boundaries to improve sight lines.

Due to the intersection location and existing site constraints, the intersection sight restrictions remain largely unchanged as recorded in the ITA.

A tracking exercise has been undertaken for a fire appliance vehicle and adequately navigates the proposed roadway. A passenger vehicle tracking envelope will navigate within the fire appliance vehicle and is deemed acceptable.

5. Alignment and existing private accesses

The horizontal alignment consists of gradual right-hand curves on the initial section with reverse curve of 20 m and 25 m radii leading into a straight alignment to the cul-de-sac head.

The vertical alignment of Weller Street has been raised from CH10 to CH50 to improve the priority movement along Weller Street. This also accommodates the tie-in with the shared private property access at CH25. It is proposed that this shared access will form a priority T-access with Weller Street. Similarly, the tie-in of existing private accesses will have to be refined at CH120 and CH130, where all will be formed as access rather than an intersection (which could be less clear in terms of priority and legibility of the Weller Street alignment).

The vertical alignment consists of a 12% grade from Portobello Road up to the existing shared access at CH25 with a flat section to CH80 as the road passes an existing garage on the right-hand side with the flat alignment also limiting the height of the retaining wall required on the left-hand side, A steep gradient up to 19% is required beyond CH80 to reach natural ground level at the cul-de-sac. This gradient will require consideration in terms of surfacing treatments to be trafficable in all-weather, including wet and icy conditions.

6. Design parameters

A design speed of 20 km/h to 30 km/h is dictated by the reverse curve, steep vertical grades and road narrowing at CH30. The 20 m and 25 m radii within the reverse curve fit a design speed of 20 km/h. Considering the low volumes, terrain and steep gradients, a higher design speed is not desirable and the achieved design speeds are considered appropriate in view of the road environment.

Table 2 Weller Street Geometric Criteria

Curve	HORIZ	VERT	Note	Design Speed
CH30	-	Crest K=1.5	Tie in to access	<40 km/h
CH50	50 m radius	1.5% grade	f=0.3	45 km/h
CH70	50 m radius	3.5% grade	f=0.3	45 km/h
CH100	20 m radius	Sag K=2	f=0.35	20 km/h
CH120	25 m radius	19% grade	f=0.35	20 km/h

Super elevation on curves is not included in the concept design but will be incorporated at detailed design for the horizontal reverse curves.

7. Retaining walls

The next design phase will refine the heights and locations of the retaining walls which have been indicatively shown as timber walls. Further, the inclusion of roadside safety barriers will have to be confirmed and have nominally been shown as w-beam barriers. Sight rails and pedestrian handrails may be necessary for pedestrian safety alongside the footpaths.

8. Next Phase

Following on from this concept design, the next phase will need to consider the following:

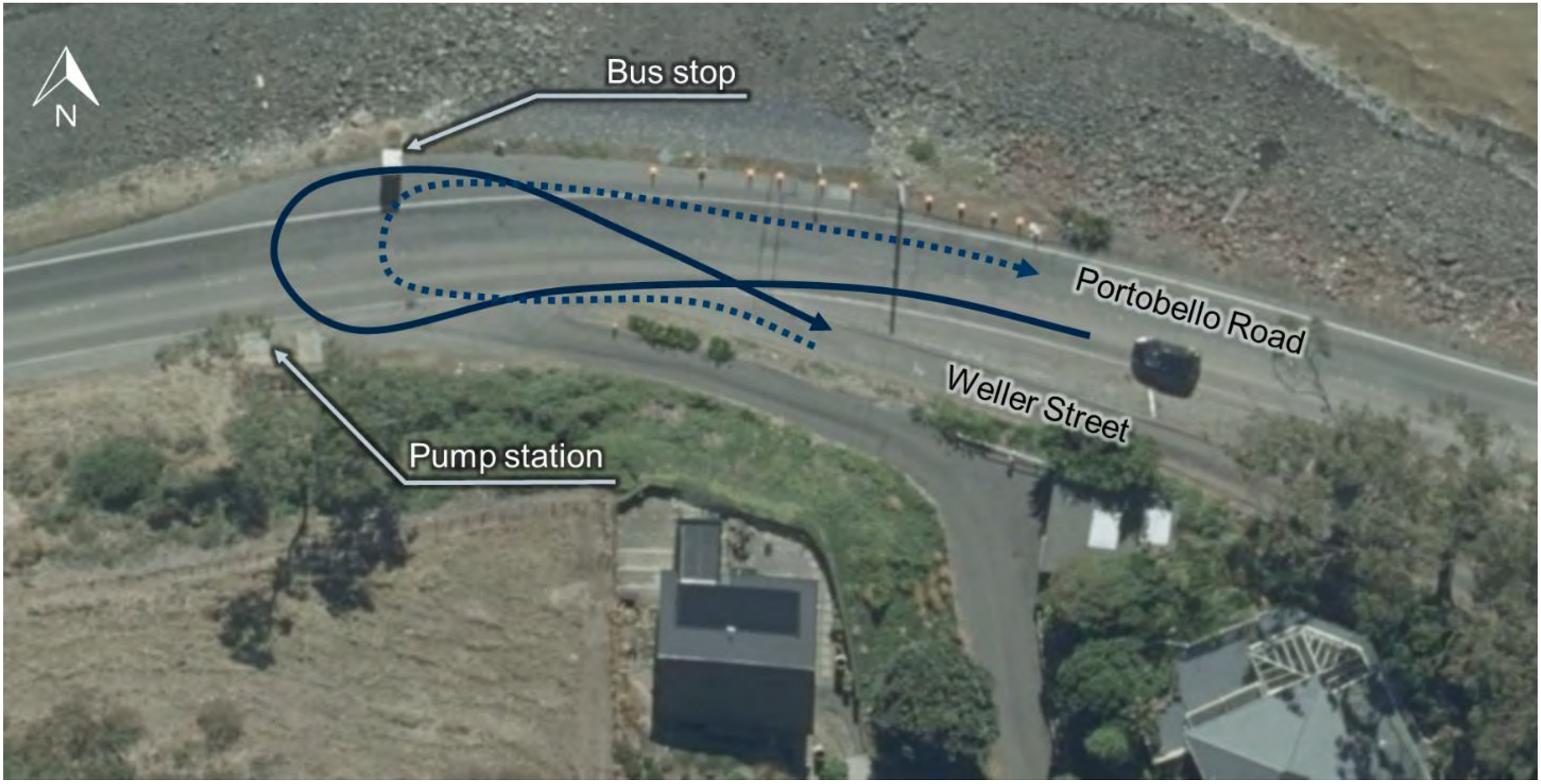
– Confirmation of waste collection point
– Proposed signage and lighting locally on Portobello Road (including suggested PW-26 ‘concealed’ warning sign)
– Retaining wall extents and construction (nominally shown as timber)
– Access levels and drainage works
– Extent and depth of new pavement
– Street lighting along Weller Street
– Layovers for visitor parking or pull-over
– Signage and linemarking
– Road safety barrier or sight rail extents and type
– Drainage features
– Maintenance areas

A road safety audit may be required for concept design and will likely be required for detailed design.

ATTACHMENT C.1 **ITA Figure 1 Site Location** ***(this is from the ITA and the SNL was updated prior to the concept design plan)***

ATTACHMENT C.2 ITA Figure 2 Portobello Road / Weller Street intersection

ATTACHMENT C.3 ITA Figure 3 Vehicles performing U-turns to access Weller Street to/from the east

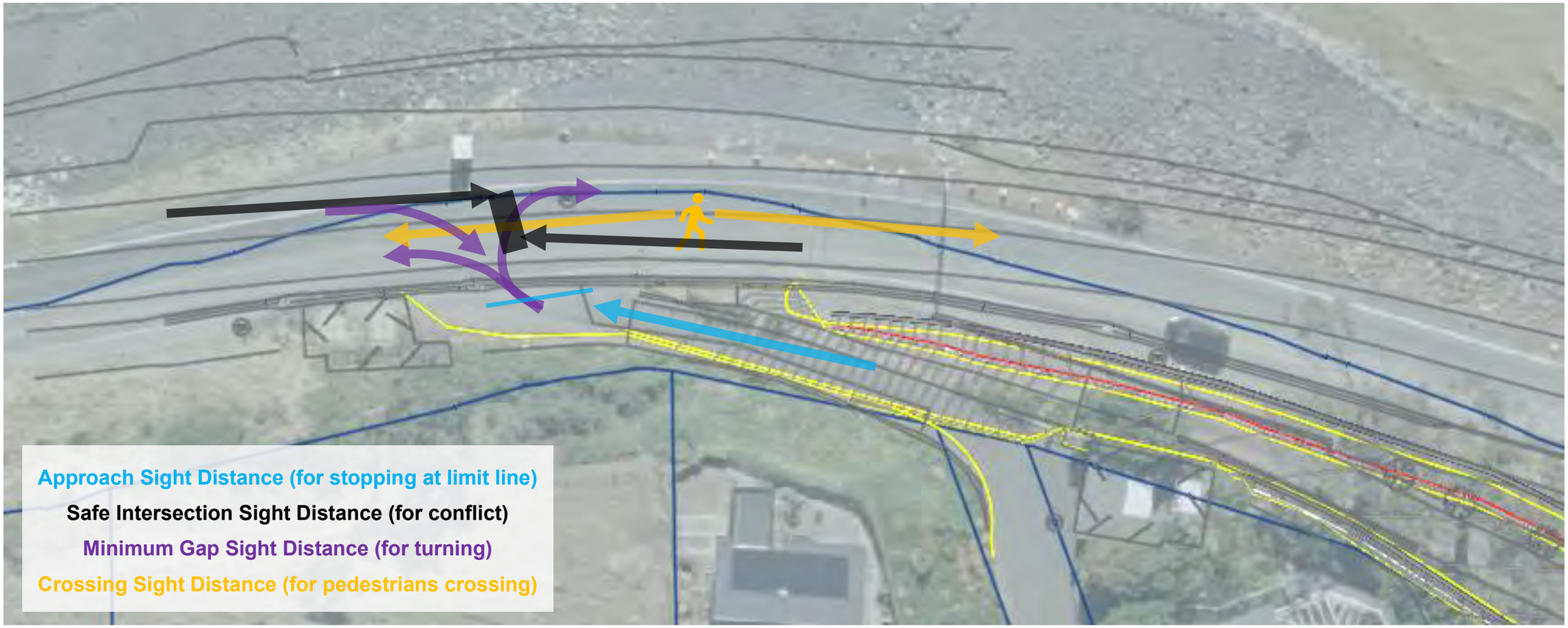


ATTACHMENT C.4 ITA Figure 4 Communal rubbish collection point and mailboxes on Portobello Road

ATTACHMENT C.5 PHOTO 1 OF Weller Street uneven surfacing, and rutting and ravelling of the surfacing observed

ATTACHMENT C.6 PHOTO 2 OF Weller Street uneven surfacing, and rutting and ravelling of the surfacing observed

ATTACHMENT C.7 Types of sight distance checks or intersections



ATTACHMENT C.8 ITA Figure 19 Excerpt of DCC Code of Subdivision and Development, Table 3.1R

Road Design Standards - Urban (speed limit ≤ 70 km/h)

Class	Type	Area served	Traffic volumes (vpd)	Design speed, (km/h)		Road reserve width[1] (m)	Minimum carriageway width (m)				Footpath (m)	Berm (m)	Max/min gradient	Normal camber	Max super-elevation	Notes
				Flat or rolling	Hilly		Parking	Traffic	Cycles	Total						
Local roads	Private Way	1-3 lots 1-6 du	N/A	N/A	N/A	4.5*	none	1 x 3.0	none	3.0*		1.5	16% max ** 0.4% min	3%	NA	Not public street. Long private ways may require passing bays no more than every 60 metres, and turning heads.
	Private Way	4-6 lots 7-12 du	N/A	N/A	N/A	6.5*		1 x 3.5		3.5*		3.0	16% max ** 0.4% min	3%	N/A	Not public street. Long private ways may require passing bays no more than every 60 metres, and turning heads.
	Short cul de sac	<10 du	N/A	N/A	N/A	14.0	***	1 x 6.0		6.0	1 x 2.0	2 x 3.0	16% max **	3%	6%	
	Minor Residential (cul de sac)	<20 du	N/A	N/A	N/A	16.0	***	1 x 6.0		6.0	2 x 2.0	2 x 3.0	16% max ** 0.4% min	3%	6%	
	Residential	<100 du	<850	40	30	16.0	***	1 x 6.0		6.0	2 x 2.0	2 x 3.0	16% max ** 0.4% min	3%	6%	
	Industrial		>300	50	40	20.0	1 x 2.5	2 x 3.5		9.5	2 x 2.0	2 x 3.25	10% max 0.4% min	3%	6%	
	Industrial/ Commercial service lane		N/A	N/A	N/A	8.0		2 x 3.5		7.0		2 x 0.5	10% max 0.4% min	3%	N/A	no parking both sides
Collector roads	Residential	<450 du	<3,000	50	40	20.0	***	2 x 3.0	2 x 2.0	10.0	2 x 2.0	2 X 3.0	12.5% max 0.4% min	3%	8%	
	Industrial/ Commercial		>1,000	50	40	20.0	2 x 2.5	2 x 3.5		12.0	2 x 2.0	2 x 2.0	10% max 0.4% min	3%	6%	
District roads	Residential	>450 du	3,000-7,000	50	50	24.0	2 x 2.5	2 X 3.5	2 x 2.0	16.0	2 x 2.0	2 x 2.0	10% max 0.4% min	3%	8%	Or specific design
Regional	National Road	-	>7,000	70	60	27.0	2 x 3.0	2 x 3.5 1 x 2.0	2 x 2.0	19.0	2 x 2.0	2 x 2.0	10% max 0.4% min	3%	8%	Or specific design

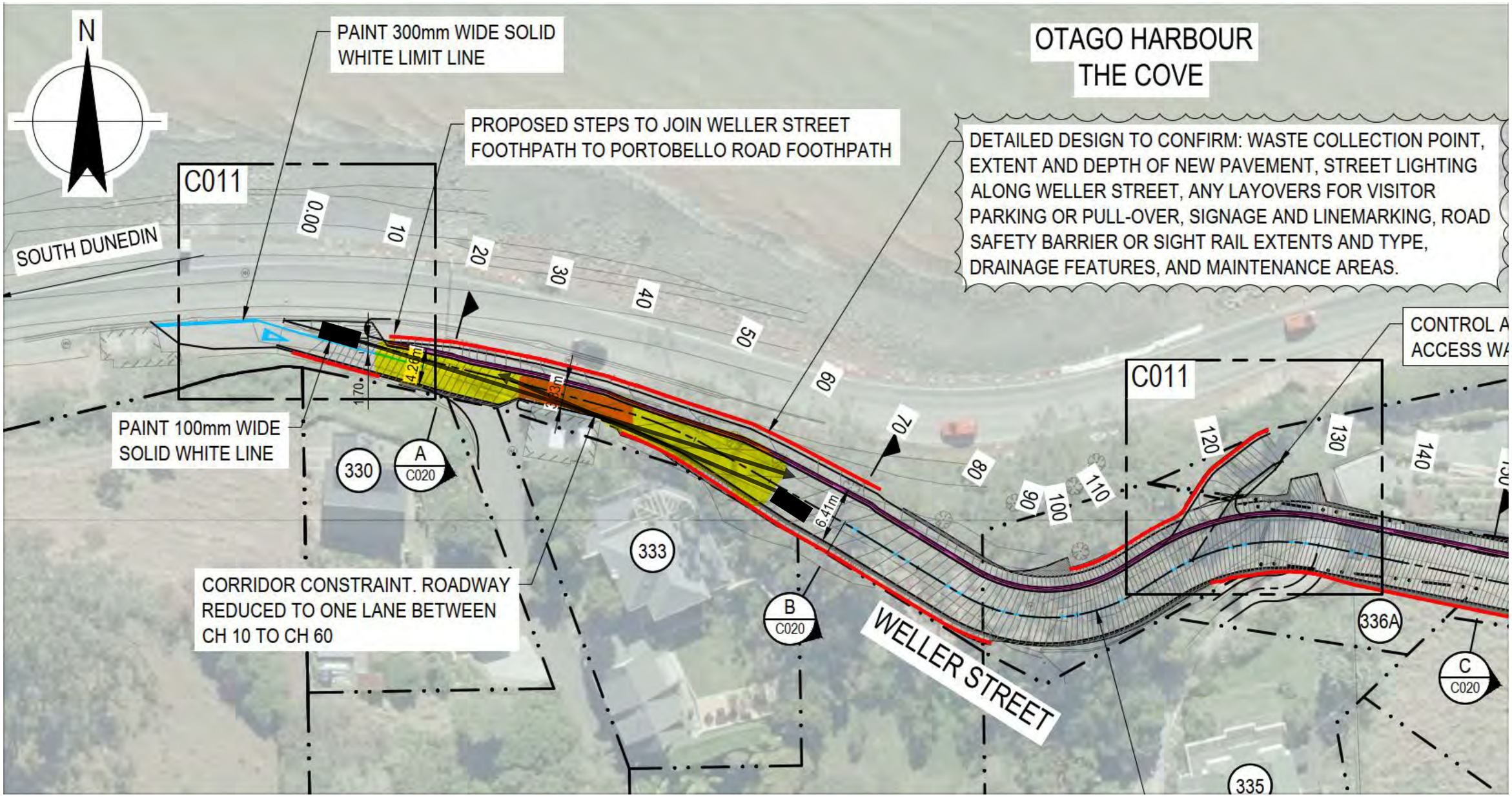
Notes: 1. Total road reserve width = carriageway + footpath/s + berm/s

* where a private way adjoins a collector road or higher, it shall have a 5m traffic width and 6m road reserve width for a minimum of 6m for road boundary.

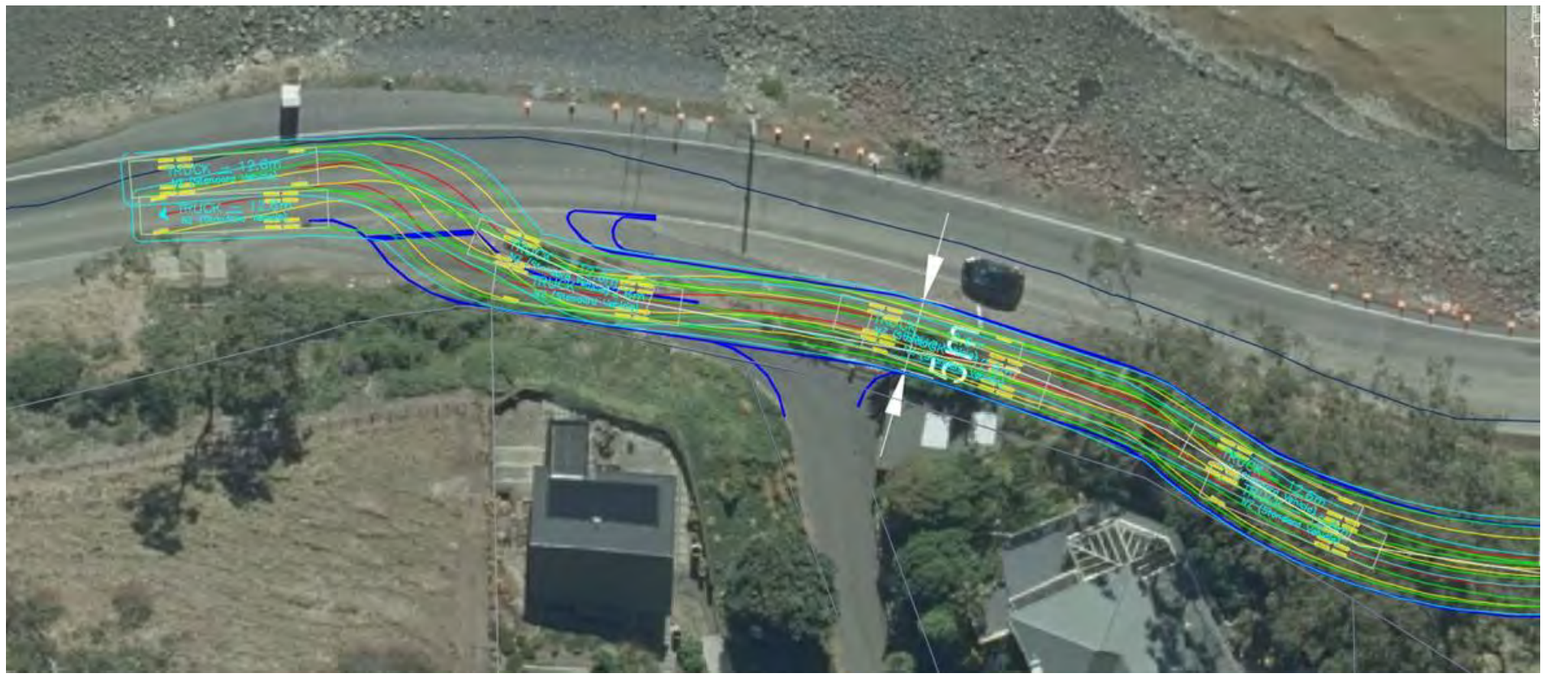
** gradients > 16%, need specific design and must be concrete

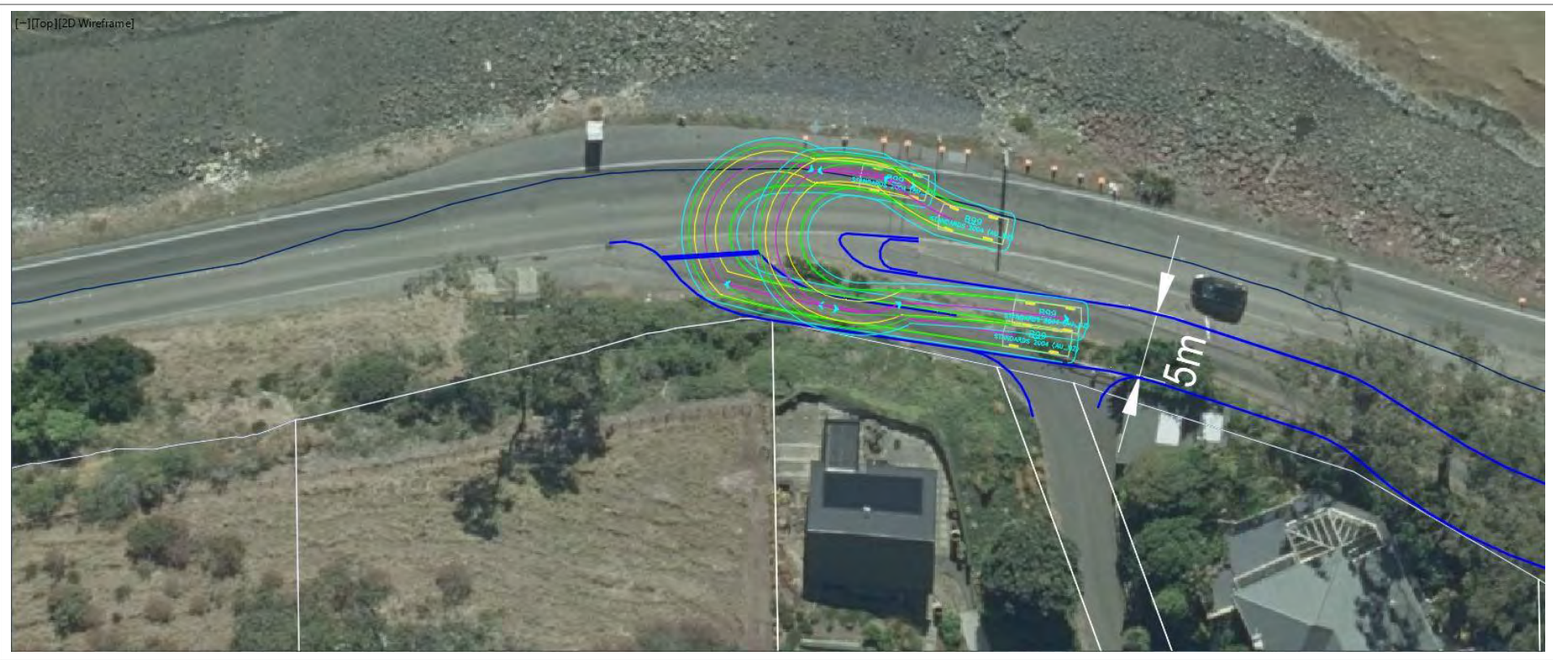
*** parking is indented and provides 1 space per 4 dwelling units (du).

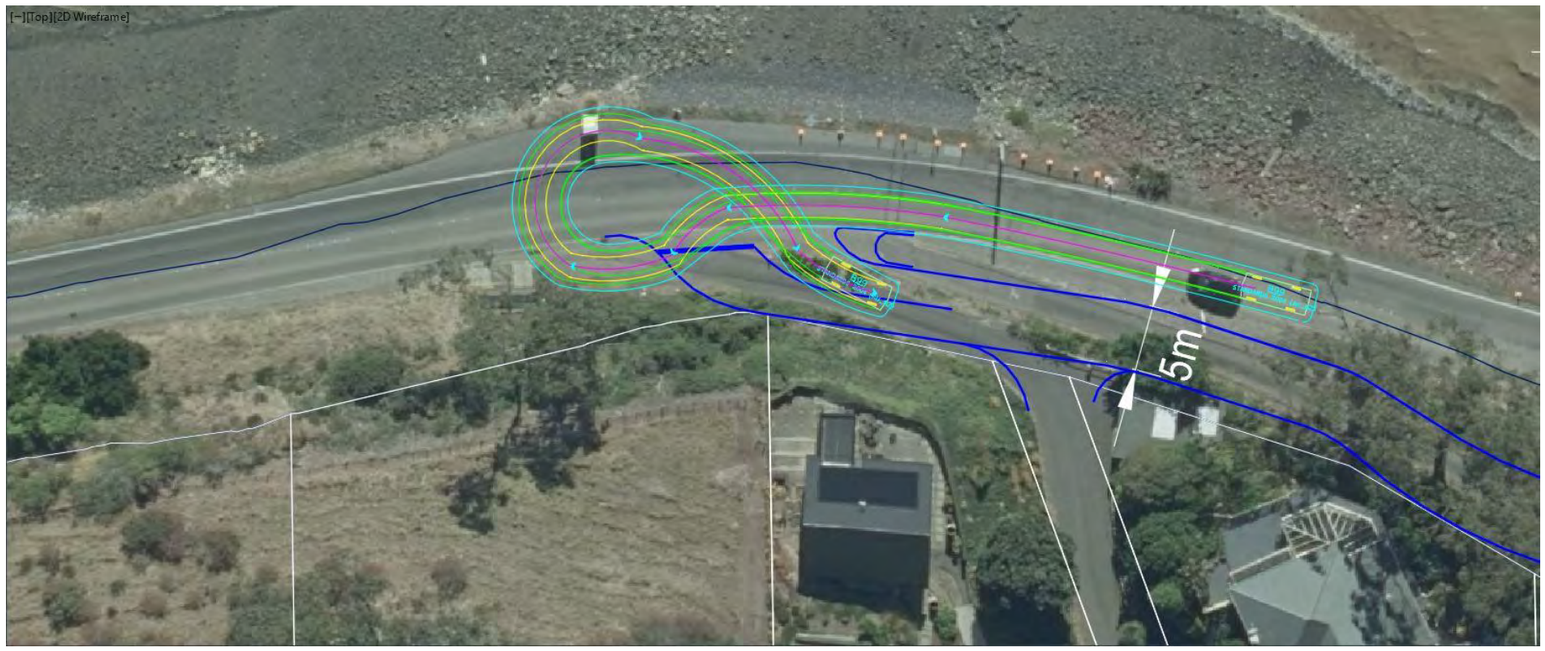
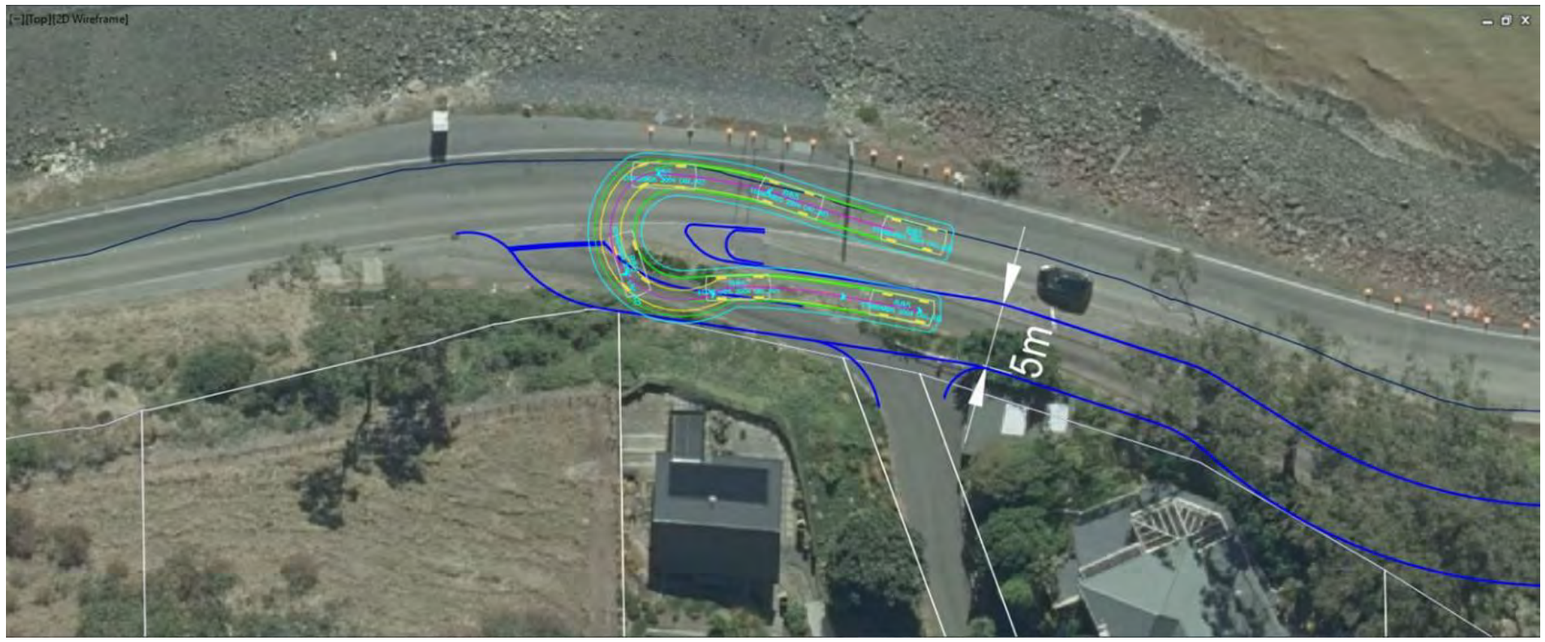
ATTACHMENT C.9 Constriction area and sight distance through the constriction for opposing movements

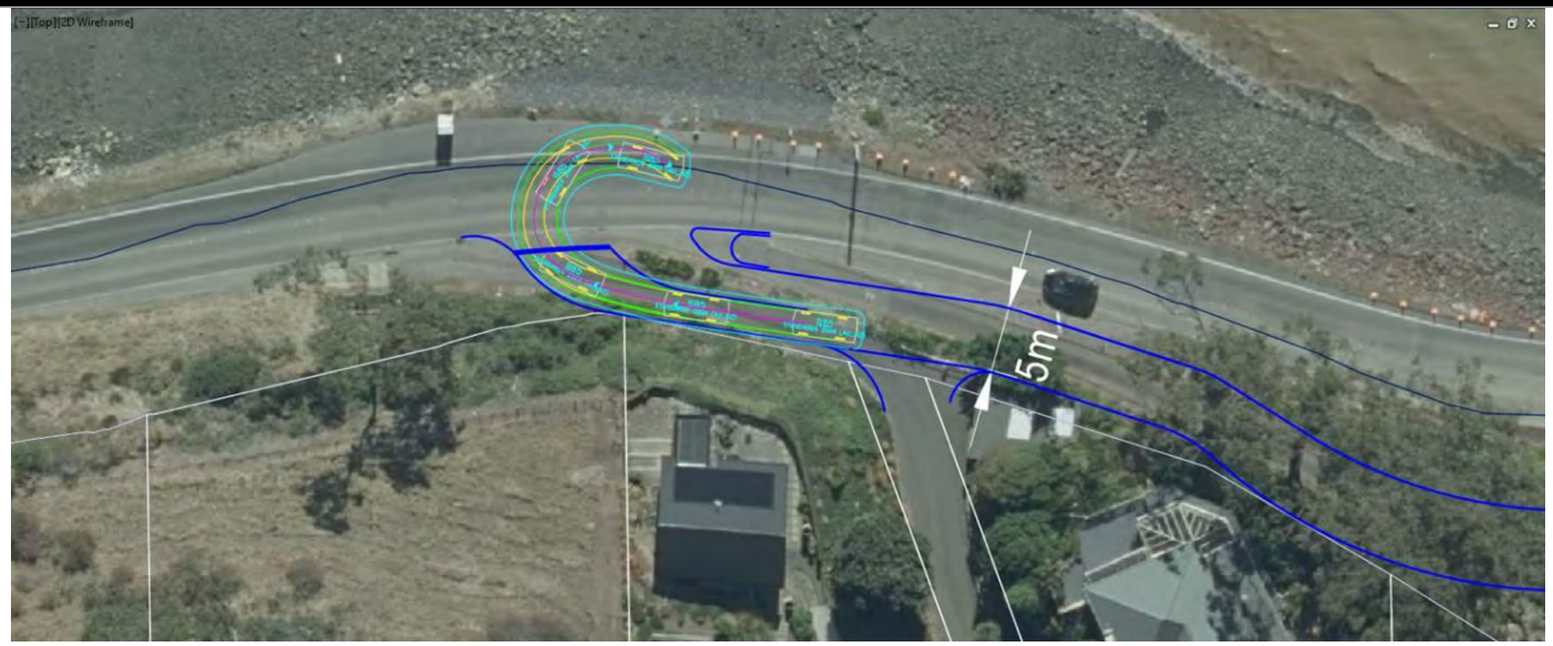


ATTACHMENT C.10 ITA Table 7 Vehicle tracking for fire appliance and B99 and B85 vehicles

Vehicle and Movement	Vehicle Tracking	Comments
12.6m fire appliance Right in from Portobello Road to Weller Street Left out from Weller Street to Portobello Road (west)	 	The assessment indicates that the vehicle can safely turn right in and left out of Weller Street. However, the vehicle encroaches on both lanes to access Weller Street. The width of Weller Street can safely accommodate the vehicle travelling along its length. Emergency vehicles will be expected to have full use of the road width at this time.

Vehicle and Movement	Vehicle Tracking	Comments
12.6m fire appliance U turn at cul-de-sac		The vehicle tracking indicates that a fire appliance cannot safely manoeuvre around the cul-de-sac in one movement. Therefore, it is recommended to modify the cul-de-sac to allow the fire appliance to safely turn around. This may impact indicative lot boundaries. However, it should be noted that this is considered to be a conservative representation of the tracking.
B99 passenger vehicle Right out from Weller Street to Portobello Road (east) Left in to Weller Street from Portobello Road (east)		The assessment indicates that the vehicle can safely turn right from Weller Street to Portobello Road (east), with the clearance slightly encroaching across the edge line on the northern side. This is considered to be acceptable, as it was observed that there are few vehicles performing this movement. A vehicle cannot safely turn left from Portobello Road (east) into Weller Street, as it requires the vehicle to undertake a u-turn while encroaching into the opposing traffic lane, which is considered a high risk manoeuvre.

Vehicle and Movement	Vehicle Tracking	Comments
B99 passenger vehicle U-turn from Portobello Road (east) into Weller STreert via pump station and bus stop		Additional B99 vehicle tracking was undertaken to demonstrate the current u-turn movement that vehicles are performing to access Weller Street from Portobello Road (east). The B99 vehicle pulls over beside the pump station, crosses two traffic lanes into the bus stop, and loops into Weller Street. This u-turn is shown with the left turns in (using both lanes on Portobello Road) and the right turns out (very limited clearance).
B85 passenger vehicle Right out from Weller Street to Portobello Road (east) Left in to Weller Street from Portobello Road (east)		The vehicle tracking for the B85 vehicle has been illustrated on Figure 15. The assessment indicated that the vehicle can safely turn right from Weller Street to Portobello Road, similarly as the B99 vehicle, with the clearance slightly encroaching across the edge line on the northern side. This is considered to be safe, as it was observed that there are few vehicles performing this movement. The B85 vehicle encountered similar issues as the B99 vehicle, and it cannot safely turn left from Portobello Road to Weller Street. The vehicle still encroaches into the opposing traffic lane, which is not considered to be safe nor acceptable. However the existing manoeuvre space is improved. Instead the u-turns undertaken currently are preferable to the tight left turns, which may result in drivers making reverse movements back onto Portobello Road. The u-turns are considered to be occasional, at low speed, with drivers familiar to indicating before braking, and with low crash risk as evidenced in the 10 year crash history. Exit / entry conflicts would be rare, anticipated, and mitigated by the wider intersection space.

Vehicle and Movement	Vehicle Tracking	Comments
		

ATTACHMENT C.11 Concept design – 12.6m firefighting appliance through the reverse curves