A9.5: Watercourse Crossings

1 Introduction

1.1.1 This appendix provides additional information on the watercourse crossings that are to be constructed or modified as part of the proposed scheme. Table 1 (Section 2) provides information on the watercourse crossing proposals as well as justification for each engineering solution. To supplement this information, photographs are provided of each existing culvert and watercourse in Table 2 (Section 3).

1.1.2 Engineering drawings are provided for each watercourse crossing in Section 4. Plan and long-section drawings are provided for the numerous smaller watercourse crossings, which are proposed to be extended beneath the widened A9 footprint. General Arrangement drawings of the Ordie Burn proposed bridge and Shochie Burn and Ordie Burn mainline culverts are provided, which presents a greater level of detail for these larger watercourses.

1.1.3 This appendix should be read in conjunction with the following sections of the ES:

- Chapter 9 (Road Drainage and the Water Environment) – potential impacts (Section 9.4) and mitigation measures (Section 9.5).
- Appendix A9.4 – which summarises residual impacts during both the construction and operational phases, after the implementation of mitigation for each watercourse.
- Figure 9.1 (Water Features) – which includes existing water features identified from desktop sources and site surveys.
- Figure 9.2 (Surface Water Hydrology) – which identifies watercourse catchments and crossing points. Note that the crossing point number identified on the figures match the watercourse numbering in Table 1 of this appendix.
- Figure 9.3 (Water Mitigation Proposals) – which identifies the location of all proposed engineering activities and mitigation proposals on watercourses.
- Figure 11.2 (Landscape and Ecological Mitigation) – which identifies all landscape and ecological mitigation proposed.

2 Watercourse Crossing Information

2.1.1 Table 1 provides information on the watercourse crossings, which are affected by the proposed scheme.

2.1.2 Cross-references are provided in the table to Section 3 and Section 4 of this appendix, which as noted above respectively provide photographs of the watercourses at each proposed crossing location and engineering design drawings of the crossings.

Table 1: Watercourse Crossings additional information

Waterbody	Culvert number	Illustrations		Construction detail	Justifications for engineering solution
		Photo	Engineering Drawing		
Shochie Burn Approximate channel bed width at culvert inlet: 9.5m	No. 1	1-2	Shochie Burn Culvert Extension General Arrangement Drawing B1557602/ST/0730/01	Upstream culvert extension under A9 widened road embankment. Existing length of twin cell box culvert = 46m Existing height = 2.5m (each box). Length of extension = 20.6m Width of extension= 9.5m Height of extension =2.7m (including 0.2m bed material) New 6m wingwall on culvert extension	The Shochie Burn is already crossed by the existing A9, therefore an extension to the existing culvert crossing beneath the proposed scheme was the only practical option considered. To avoid increased flood risk downstream, increasing the size of the culvert was also discounted. Overall, the best practicable environmental solution for the extension of the culvert is considered to be a portal frame culvert (with scour apron). A number of alternative forms of crossing were considered for the extension of the Shochie Burn Culvert. These included: • Twin cell box invert culvert: this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. Although this option would provide similar operational benefits to the portal frame structure below, it would involve a greater extent of piling during construction within the SAC. • Portal frame culvert (with scour apron): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. In addition, foundations/piles would only be required on the underside of the footings of the portal frame. The foundations would be protected from scouring by constructing a concrete apron/slab below the existing bed surface. Natural substrate would be placed on top of the apron to the required minimum depth throughout the culvert. • Bridge: it would be impractical to provide a bridge structure as an extension to the existing twin cell culverts. The required structure would have a long span and the associated costs would also be significantly higher than the other options. The duration and extent of temporary works for construction of the bridge option would be significantly greater than that of the above culvert extension options.
Ordie Burn Approximate channel bed width at culvert inlet: 9.5m	No. 2	3-4	Ordie Burn Culvert Extension General Arrangement Drawing B1557602/ST/1640/01	Upstream culvert extension under A9 widened road embankment. Existing length of twin cell box culvert = 30m Existing height = 2.5m (each box) Length of extension =15.6 m Width of extension= 9.5m Height of extension =2.7m (including 0.2m bed material) New 6m wingwalls on culvert extension.	The Ordie Burn is already crossed by the existing A9, therefore an extension to the existing culvert crossing beneath the proposed scheme was the only practical option considered. To avoid increased flood risk flood risk downstream, increasing the size of the culvert was also discounted. Overall, the best practicable environmental solution for the extension of the culvert is considered to be a portal frame culvert (with scour apron). A number of alternative forms of crossing were considered for the extension of the Ordie Burn Culvert. These included: • Twin cell box invert culvert: this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. Although this option would provide similar operational benefits to the portal frame structure below, it would involve a greater extent of piling during construction within the SAC. • Portal frame culvert (with scour apron): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. In addition, foundations/piles would only be required on the underside of the footings of the portal frame. The foundations would be protected from scouring by constructing a concrete apron/slab below the existing bed surface. Natural substrate would be placed on top of the apron to the required minimum depth throughout the culvert. • Bridge: it would be impractical to provide a bridge structure as an extension to the existing twin cell culverts. The required structure would have a long span and the associated costs would also be significantly higher than the other options. The duration and extent of temporary works for construction of the bridge option would be significantly greater than that of the above culvert extension options.
Unnamed tributary 4 of Ordie Burn	No. 2a	5-6	Proposed Culvert No. 2a Drawing B1557602/0520/025	Upstream/downstream pipe culvert extension under A9 widened road embankment.	This watercourse is already crossed by the existing A9 carriageway and the old A9 road. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert at both upstream and downstream end.

Waterbody	Culvert number	Illustrations		Construction detail	Justifications for engineering solution
		Photo	Engineering Drawing		
Approximate channel bed width at culvert inlet: 0.7m				Dimensions: Diameter = 900mm Existing length = 35m Length of Extension = 25m	A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mmdiameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction. Compensatory Storage: The estimated loss of existing flood plain is 215m^3 at the upstream end of culvert 2a. To mitigate the loss of food plain, it is proposed to have an enlarged pre-earthwork channel with a nominal flow channel over a length of approximately 450 m. The proposed width at the base is 1.6m and the depth of channel is 0.8m.
Unnamed tributary 3 of Ordie Burn Approximate channel width at culvert inlet: 0.7m	No. 2b	7-8	Proposed Culvert 2b Drawing B1557602/0520/026	Upstream / downstream pipe culvert extension under A9 widened road embankment at Marlehall. Dimensions: Diameter = 750mm Existing length = 50m Length of Extension = 33m	This watercourse is already crossed by the existing A9 carriageway and the old A9 road to Luncarty. The watercourse discharges to a private pond located on the west of the A9 carriageway. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert at both at upstream and downstream end.The potential loss of flood plain was investigated and it was determined that there is no loss of flood plain as a result of the dualling of the A9 carriageway. The results are discussed in more detail in section 4.5 of Appendix 9.2: Flood Risk. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mm diameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.
Unnamed Tributary 4 of Ordie Burn (by Newmill)	No. 2c	9, 10 and 14	Proposed Culvert 2c drawing B1557602/0520/027	3 new pipe culverts to facilitate channel realignment under Tullybelton / Stanley grade-separated junction. Dimensions:	Due to the proposed alignment of the Tullybelton/Stanley junction, the watercourse has to be realigned. Overall, the best practicable environmental solution is considered to be the circular pipe. It is mainly due to the simplicity in constructing the culvert. The inlet of the proposed culvert will consist of a 300mm diameter orifice plate to limit the flow rate and to maintain the downstream water level to pre-development conditions during a flood event. The risk of blockage will be mitigated with an appropriately designed inlet which will be maintained by the Operating

Waterbody	Culvert number	Illustrations		Construction detail	Justifications for engineering solution
		Photo	Engineering Drawing		
Approximate channel bed width in this location: 0.5m				Diameter = 900mm (each culvert) Existing length= 7m Total length of realignment = 165m	Company on behalf of Transport Scotland. The proposal is discussed in more detail in Section 4.3 of the Appendix A9.2: Flood Risk. A number of alternatives forms of crossings were considered for the proposed realignment. These included: • Circular concrete pipe: this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mm diameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.
Unnamed Tributary of Ordie Burn (by Newmill Cottages) Approximate channel bed width at culvert inlet: 0.5m	No. 2d	11-12	Proposed Culvert 2d drawing B1557602/0520/028	Rectangular channel culverts to drain pre-earthwork runoff. Dimensions: Depth = 900mm Width = 800mm	The covered rectangular channel currently crosses underneath the field located adjacent to Newmill Cottages. A like for like replacement is considered to be the best practicable environmental solution in this instance. The structural integrity of the channel will be assessed on site and strengthened or replaced if required.
Proposed Ordie Burn Overbridge Approximate channel bed width at crossing: 7.0m	No. 2e	13	New Ordie Burn Bridge General Arrangement Drawing B1557602/ST/3030/01	The existing masonry arch crossing the Ordie Burn at Newmill will be demolished and a new overbridge will be constructed on the side road west of the proposed Tullybelton / Stanley grade-separated junction. The new crossing shall be a 3 span bridge over the ordie burn with 30m main span over the watercourse.	Overall, the best practicable environmental solution for the new overbridge is considered to be an open span bridge with precast beams as this will result in the least disruption during construction and minimises the hydrological impact by constructing outwith the bed and bank of the watercourse. A number of alternative forms of crossing were considered for the new Ordie Burn Overbridge. These included: • Twin cell box culvert: this option satisfied the basic hydraulic requirements for conveying water beneath the carriageway. It would be a buried structure of reinforced concrete construction, spanning the width of the burn only. The natural riverbed would be impacted by the introduction of a slab invert. The use of a central dividing wall could impact on flood flows through the structure. • Portal frame culvert: this option satisfied the basic hydraulic requirements for conveying water beneath the carriageway. It would be a buried structure of reinforced concrete construction, with vertical walls set back from the edge of the burn. Foundations would be set at a suitable level to avoid additional scour protection measures. Construction activity could be expected to impact on the natural riverbank. Clear, dry access for wildlife would be provided by raised ledges. • Open span bridge (concrete slab): Reinforced concrete slab at road level. Abutments would be set-back at the top of the approach embankment to allow the natural riverbank and riverbed to be retained. Temporary works during construction would likely impact on the riverbanks. Post-construction, passage

Waterbody	Culvert number	Illustrations		Construction detail	Justifications for engineering solution
		Photo	Engineering Drawing		
					for wildlife species would not be impacted, even at times of high flow. • Open span bridge (precast beams): Precast concrete beams supporting a concrete slab deck. Abutments would be set-back at the top of the approach embankment to allow the natural riverbank and riverbed to be retained. Construction impacts on areas below bridge would be minimised. Post-construction, passage for wildlife species would not be impacted, even at times of high flow.
Ardonachie Burn Approximate channel bed width at culvert inlet: 0.5m	No. 3	15-16	Extension of Culvert No. 3 Ardonachie Burn Drawing B1557602/0520/030	Upstream pipe culvert extension under A9 widened road embankment. Dimensions: Diameter = 900mm Existing length =60m Length of extension =16m	This watercourse is already crossed by the existing A9 carriageway and the old A9 road. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mmdiameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction. Compensatory storage: The estimated loss of existing flood plain is 77m^3. The solution to mitigate the loss of flood plain is to re-profile the channel/burn to provide a two stage channel. It involves cutting the banks of the channel by 0.250m deep and 2.0m wide over approximately 40m in length along the watercourse.
Unnamed drain 3 Approximate channel bed width at culvert inlet: 0.5m	No. 4	17-18	Proposed Culvert 4 Drawing B1557602/0520/031	Downstream only pipe culvert extension under A9 widened road embankment. Dimensions: Diameter = 600mm Existing length = 19m Length of extension = 16m	This watercourse is already crossed by the existing A9 carriageway and the old A9 road. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mm diameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.

Waterbody	Culvert number	Illustrations		Construction detail	Justifications for engineering solution
		Photo	Engineering Drawing		
Unnamed drain 4 Approximate channel bed width at culvert inlet: 0.5m	No. 5	19-20	Proposed Culvert 5 Drawing B1557602/0520/032	Upstream/downstream pipe culvert extension under A9 widened road embankment. Dimensions: Diameter = 600mm Existing length =30m Length of extension = 25m	This watercourse is already crossed by the existing A9 carriageway and the old A9 road. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mm diameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.
Unnamed tributary 1 of Gelly Burn Approximate channel bed width at culvert inlet: 0.6m	No. 5a	21-22	Proposed Culvert 5a Drawing B1557602/0520/033	Downstream pipe culvert extension under A9 widened road embankment. Dimensions: Diameter = 600mm Existing length = 23m Length of extension = 32m	This watercourse is already crossed by the existing A9 carriageway and the old A9 road. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mm diameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.
Unnamed tributary 2 of Gelly Burn Approximate channel bed width at culvert inlet: 0.6m	No. 6	23-24	Proposed Culvert 6 Drawing B1557602/0520/034	Downstream pipe culvert extension under A9 widened road embankment. Dimensions: Diameter = 600mm Existing length = 25m Length of extension = 30m	This watercourse is already crossed by the existing A9 carriageway and the old A9 road. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mm diameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream.

Waterbody	Culvert number	Illustrations		Construction detail	Justifications for engineering solution
		Photo	Engineering Drawing		
					Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.
Gelly Burn (north) Approximate channel bed width at culvert inlet: 0.9m	No. 7	25-26	Proposed Culvert 7 Drawing B1557602/0520/035	Downstream pipe culvert extension under A9 widened road embankment. Dimensions: Diameter = 900mm Existing length = 25m Length of Extension = 30m	The Gelly Burn is already crossed by the existing A9 carriageway and therefore a crossing extension beneath the proposed scheme was the only practical option considered. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mm diameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.
Unnamed drain 5 Approximate channel bed width at culvert inlet: 0.5m	No. 8	27-28	Proposed Culvert 8 Drawing B1557602/0520/036	Downstream pipe culvert extension under A9 widened road embankment. Dimensions: Diameter = 600mm Existing length = 20m Length of extension = 10m	This watercourse is already crossed by the existing A9 carriageway. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mmdiameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.
Unnamed tributary 3 of Gelly Burn	No. 9	29-30	Proposed Culvert 9 Drawing – B1557602/0520/037	Downstream pipe culvert extension under A9 widened road embankment.	This watercourse is already crossed by the existing A9 carriageway. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included:

Waterbody	Culvert number	Illustrations		Construction detail	Justifications for engineering solution
		Photo	Engineering Drawing		
Approximate channel bed width at culvert inlet: 0.6m				Dimensions: Diameter = 1050mm Existing length = 27m Length of Extension = 18m	• Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mm diameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.
Broomhill Burn Approximate channel bed width at culvert inlet: 0.7m	No. 10	31-32	Proposed Culvert No. 10 Broomhill Burn - B1557602/0520/038	Twin pipe under A9 widened road embankment. Proposed culvert diameter = increase to 450mm (twin pipe) from existing 375mm twin pipes. Existing length = 18m Length of extension = 12m	The Broomhill Burn is already crossed by the existing A9 carriageway and therefore a crossing extension beneath the proposed scheme was the only practical option considered. Overall, the best practicable environmental solution is considered to be a vertical realignment of Broomhill Burn and a new 450mm diameter twin pipe culvert. A number of alternative forms of crossing were considered for the culvert extension. These included: • Extension of existing culvert (circular concrete pipe): the existing 375mm diameter twin pipe culvert does not satisfy the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It is estimated to surcharge at the 0.5% AEP (1:200 return period) flood by 300mm at the upstream end of the culvert. In addition, the cover level (soffit of culvert to road surface) is approximately 400mm, which is below the recommended cover of 1200mm • Box culvert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to be greater than 900mm which would require extensive vertical realignment of the burn to satisfy the cover level from the road level to the soffit of the culvert. . • 450mm diameter twin pipe culvert: The 450mm twin pipes would satisfy the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. This would improve the flow capacity of the culvert and prevent surcharged conditions upstream. This option would involve the vertical realignment of the existing burn over an approximate 300m length in order to meet the required cover level of 1200mm, in line with the design standard- DMRB.
Unnamed watercourse Approximate channel bed width at culvert inlet: 0.5m	No. 11	33-34	Proposed Culvert No. 11 B1557602/0520/039	Downstream pipe culvert extension under A9 widened road embankment. Dimensions: Diameter = 0.6m Existing length = 25m Length of Extension = 13m	This watercourse is already crossed by the existing A9 carriageway. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mm diameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the

Waterbody	Culvert number	Illustrations		Construction detail	Justifications for engineering solution
		Photo	Engineering Drawing		
					culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.
Unnamed watercourse Approximate channel bed width at culvert inlet: 0.5m	No. 12	35-36	Proposed Culvert No. 12 B1557602/0520/040	Downstream pipe culvert extension under A9 widened road embankment. Dimensions: Diameter = 0.6m Existing length = 30m Length of Extension = 10m	This watercourse is already crossed by the existing A9 carriageway. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mmdiameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.
Unnamed watercourse Approximate channel bed width at culvert inlet: 0.8m	No. 13	37-38	Proposed Culvert No. 13 B1557602/0520/041	Downstream pipe culvert extension under A9 widened road embankment. Dimensions: Diameter = 1.05m Existing length = 35m Length of Extension = 10m	This watercourse is already crossed by the existing A9 carriageway. Overall, the best practicable environmental solution is considered to be an extension matching the existing circular pipe culvert both at the upstream and downstream end. A number of alternative forms of crossing were considered for extension of the culvert. These included: • Extension of existing culvert (circular concrete pipe): this option satisfies the basic hydraulic requirements for conveying water beneath the proposed scheme carriageway. It was also the most viable solution as it matches the existing culvert. • Box culvert with a depressed invert (precast concrete box): this option satisfies the basic hydraulic requirements for conveying water beneath the carriageway. However, the box culvert would have to have dimensions greater than the existing 900mm diameter culvert thereby increasing the flow capacity of the culvert which is likely to exacerbate the flood risk downstream. Providing a box culvert as an extension to the existing circular culvert is considered inappropriate as a result of the increased risk of blockages and negative impacts on the hydraulic performance of the culvert. Providing a box culvert to replace the circular culvert over its full length is also considered inappropriate due to the increased risk of flooding downstream and the complexities involved during construction.

3 Photographs

3.1.1 Upstream and downstream photographs of each of the culverts and watercourses are provided in Table 2.

Table 2: Watercourse photographs

	
Photograph 1: Culvert No. 1 – Looking downstream towards the inlet of the existing Shochie Burn twin cell box culvert under the A9 single carriageway embankment (upstream side to be extended).	**Photograph 2:** Culvert No.1 – Looking upstream towards the outlet of the existing Shochie Burn twin cell box culvert under the A9 single carriageway embankment.

Photograph 3:
Culvert No. 2 – Looking downstream towards the inlet of the existing Ordie Burn twin cell box culvert under the A9 single carriageway embankment (upstream side to be extended).

Photograph 4:
Culvert No. 2 – Looking upstream towards the outlet of the existing Ordie Burn twin cell box culvert under the A9 single carriageway embankment.

Photograph 5
Culvert No. 2a – Looking downstream towards the inlet of existing pipe culvert under the A9 carriageway embankment (Unnamed Tributary 4 of Ordie Burn).

Photograph 6
Culvert No. 2a – Looking upstream towards the outlet of existing pipe culvert under the A9 carriageway embankment (Unnamed Tributary 4 of Ordie Burn).

Photograph 7:
Culvert No. 2b – Masonry arch structure upstream of the inlet of the existing Marlehall Culvert under the old and existing A9 carriageway embankment (Unnamed Tributary 3 of Ordie Burn).

Photograph 8:
Culvert No. 2b – Below the masonry structure facing the inlet of the existing Marlehall Culvert under the old and existing A9 carriageway embankment (Unnamed Tributary 3 of Ordie Burn).

	
Photograph 9: Culvert No. 2c – Looking downstream towards the inlet of the existing culvert crossing the existing side road to Tullybelton Road (Unnamed Tributary 4 of Ordie Burn).	**Photograph 10:** Culvert No. 2c – Looking downstream of the culvert outlet (Unnamed Tributary 4 of Ordie Burn).

	
Photograph 11: Culvert No. 2d – Looking downstream towards the inlet of the existing channel adjacent to Newmill cottages (Unnamed Tributary of Ordie Burn by Newmill Cottages).	**Photograph 12** Culvert No. 2d – Looking upstream towards the outlet of the existing culvert along the side road at Newmill cottages (Unnamed Tributary of Ordie Burn by Newmill Cottages).

Photograph 13:

Culvert No. 2e – Downstream side of the existing Ordie Burn culvert under Newmill side road (to be demolished) (Ordie Burn).

Photograph 14:

Culvert No. 2c - Facing downstream along the tributary 4 of Ordie Burn in vicinity of the proposed channel realignment and culverting works for the Tullybelton grade-separated junction. The existing masonry arch bridge crossing the Ordie burn is visible in the background.

Photograph 15:
Culvert No. 3 – Looking downstream towards the inlet of the existing Ardonachie Burn pipe culvert under the A9 carriageway embankment.

Photograph 16:
Culvert No. 3 – Looking upstream towards the Ardonachie Burn outfall to the Garry Burn.

	
Photograph 17: Culvert No. 4 – Looking downstream towards the inlet of the existing pipe culvert under the A9 carriageway (Inlet) (Unnamed Drain 3).	**Photograph 18:** Culvert No. 4 – Looking upstream towards the outlet of the existing pipe culvert under the A9 carriageway (Unnamed Drain 3).

	
Photograph 19: Culvert No. 5 – Looking downstream towards the inlet of the existing pipe culvert under the A9 carriageway (Inlet) (Unnamed Drain 4).	**Photograph 20:** Culvert No. 5 – Looking upstream towards the outlet of the existing pipe culvert under the A9 carriageway (Unnamed Drain 4).

Photograph 21:
Culvert No. 5a – Looking downstream towards the inlet of the existing pipe culvert under the A9 carriageway embankment (Unnamed Tributary 1 of Gelly Burn).

Photograph 22:
Culvert No. 5a – Looking upstream towards the outlet of the existing pipe culvert under the A9 carriageway embankment (Unnamed Tributary 1 of Gelly Burn).

Photograph 23:
Culvert No. 6 – Looking downstream towards the inlet of the existing pipe culvert under the A9 carriageway embankment (Unnamed Tributary 2 of Gelly Burn).

Photograph 24:
Culvert No. 6 –Looking upstream towards the outlet of the existing pipe culvert under the A9 carriageway embankment (Unnamed Tributary 2 of Gelly Burn).

Photograph 25:
Culvert No. 7 – Looking downstream towards the inlet of the existing Gelly Burn pipe culvert under the A9 carriageway embankment (Gelly Burn north).

Photograph 26:
Culvert No. 7 – Looking upstream towards the outlet of the existing Gelly Burn pipe culvert under the A9 carriageway embankment (Gelly Burn north).

Photograph 27:
Culvert No. 8 – Looking downstream towards the inlet of the existing pipe culvert under the A9 carriageway (Inlet) (Unnamed Drain 5).

Photograph 28:
Culvert No. 8 – Looking upstream towards the outlet of the existing pipe culvert under the A9 carriageway (UnnamedDrain 5).

Photograph 29:
Culvert No. 9 – Looking downstream towards the inlet of the existing pipe culvert under the A9 carriageway embankment (Unnamed Tributary 3 of Gelly Burn).

Photograph 30:
Culvert No. 9 – Looking upstream towards the outlet of the existing pipe culvert under the A9 carriageway embankment (Unnamed Tributary 3 of Gelly Burn).

Photograph 31:
Culvert No. 10 – Looking downstream towards the inlet of the existing Broomhill Burn twin pipe culvert under the A9 carriageway embankment.

Photograph 32:
Culvert No. 10 – Looking upstream towards the outlet of the existing Broomhill Burn twin pipe culvert under the A9 carriageway embankment.

Photograph 33:
Culvert No. 11**–** Looking downstream towards the inlet of the existing pipe culvert under the A9 carriageway.

Photograph 34
Culvert No. 11– Looking upstream towards the outlet of the existing pipe culvert under the A9 carriageway.

Photograph 35:
Culvert No. 12 – Looking downstream towards the inlet of the existing pipe culvert under the A9 carriageway (Inlet).

Photograph 36:
Culvert No. 12 – Looking upstream towards the outlet of the existing pipe culvert under the A9 carriageway.

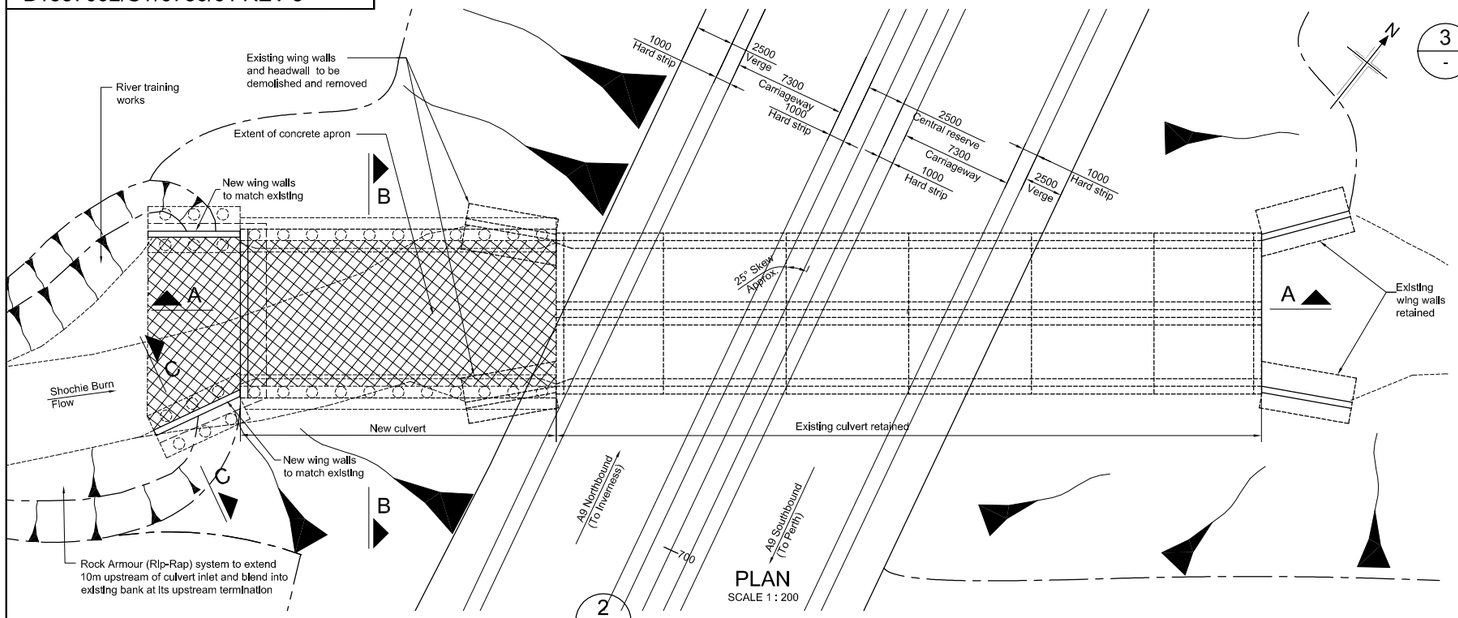
Photograph 37:
Culvert No. 13 – Looking downstream towards the inlet of the existing pipe culvert under the A9 carriageway (Inlet).

Photograph 38:
Culvert No. 13 **–** Looking upstream towards the inlet of the existing pipe culvert under the A9 carriageway (Inlet).

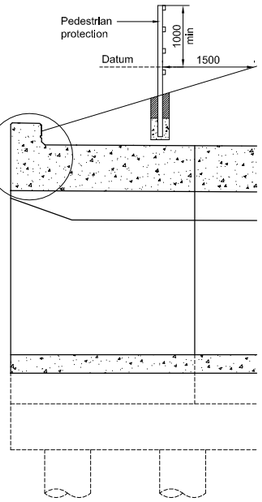
4 Drawings

4.1.1 Engineering drawings are provided for each watercourse crossing. Plan and long-section drawings are provided for the numerous smaller watercourse crossings, which are proposed to be extended beneath the widened A9 footprint. General Arrangement drawings of the Shochie Burn and Ordie Burn mainline culverts are provided, which presents a greater level of detail for these larger watercourses.

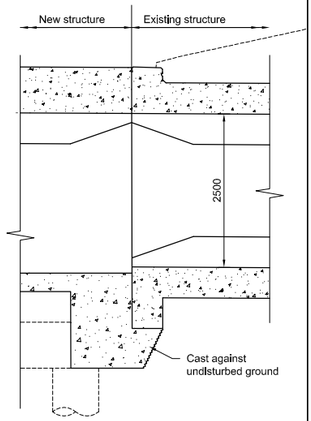
Drawing number / Rev
B1557602/ST/0730/01 REV 3



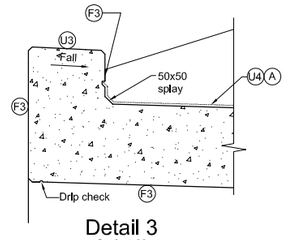
PLAN
SCALE 1 : 200



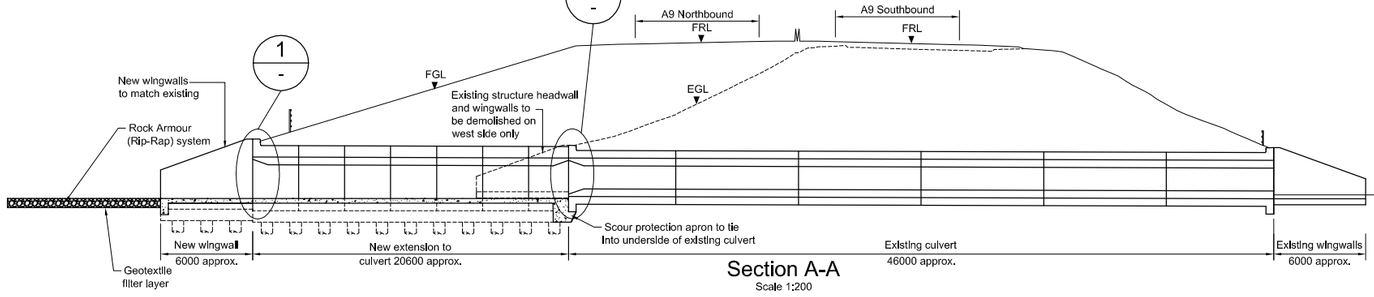
Detail 1
Scale 1:50



Detail 2
Scale 1:50



Detail 3
Scale 1:20



Section A-A
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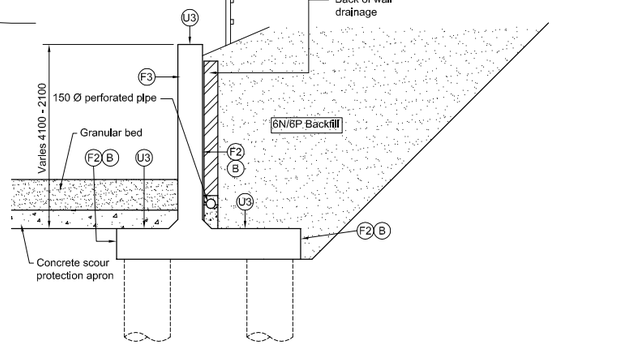
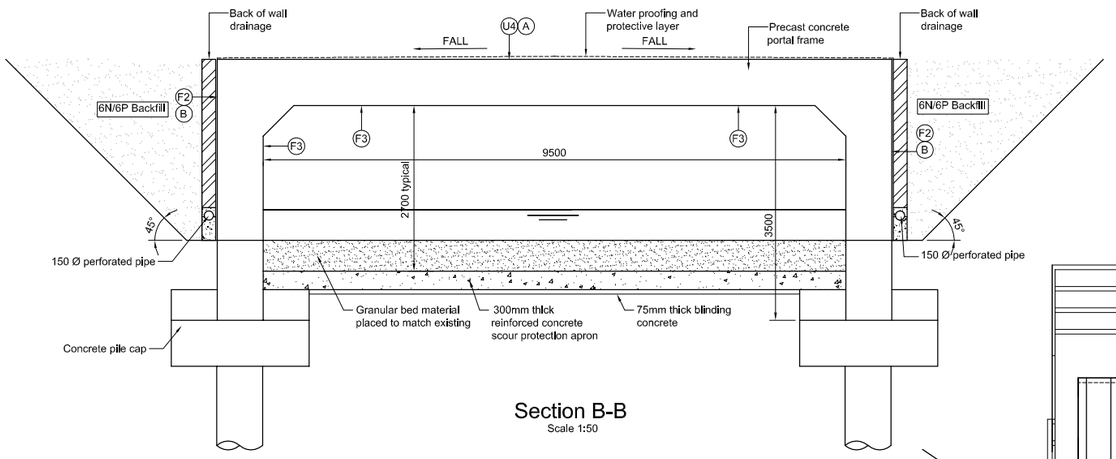
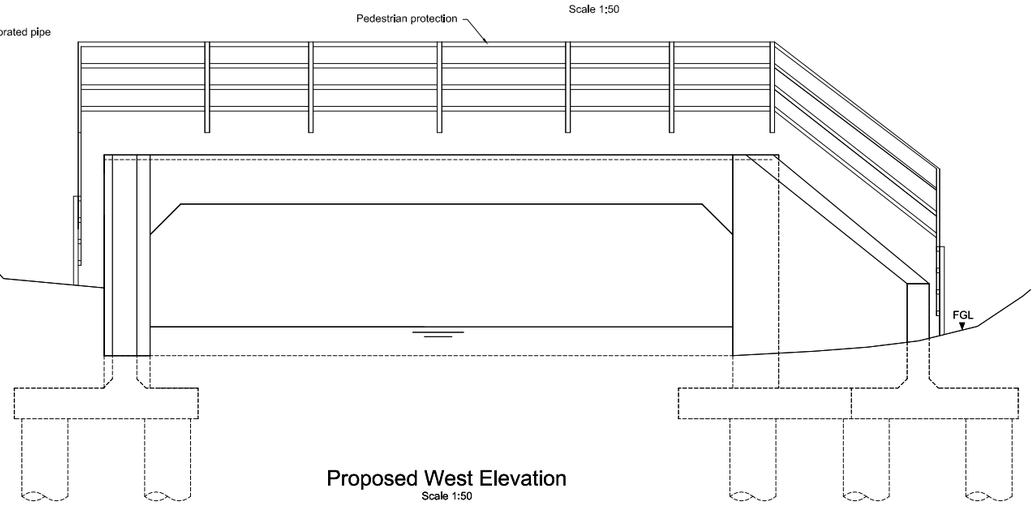


Section C-C
Scale 1:50



Section B-B
Scale 1:50



Proposed West Elevation
Scale 1:50

Notes.

1. All dimensions are in millimetres unless noted otherwise.
2. All levels and chainages in metres.
3. Concrete finishes denoted thus:
   - (F) - Formed
   - (U) - Unformed
4. Concrete protection to be as follows:
   - (S) - Surface Impregnation in accordance with Cl 1709 of the Specification.
   - (A) - Spray applied waterproofing in accordance with Cl 2003 of the Specification.
   - (B) - Waterproofing of all buried concrete surfaces in accordance with Cl 2004 of the Specification.
5. All details shown on this drawing are indicative only and subject to development at detailed design stage.
6. Foundations shown are indicative only and are to be confirmed.
7. Headroom within existing culvert varies due to natural disposition of bed material.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following :

CONSTRUCTION

- Service survey required pre-construction.
- Structure stability to be checked during and after break-out / demolition of existing structure.
- Nature and position of the existing structure foundations to be verified pre-construction by undertaking investigations
- Inspection / testing of existing structure required pre-construction
- Position of structure may not be as shown
- Ecologically sensitive watercourse
- Waterproofing membrane on roof slab of existing sections of culvert may contain asbestos

MAINTENANCE / CLEANING

- Ecologically sensitive watercourse

DECOMMISSIONING / DEMOLITION

- Ecologically sensitive watercourse
- Waterproofing membrane on roof slab of existing sections of culvert may contain asbestos

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
3	December 2013	MINOR AMENDEMENTS MADE	NC	MAM	MAM	EM
2	November 2013	SCOUR PROTECTION ADDED AND MINOR AMENDEMENTS MADE	NC	MAM	MAM	AJG
1	October 2013	MINOR AMENDEMENTS	NC	DG	DG	PMS
0	March 2013	PRELIMINARY ISSUE	PM	GDP	SF	MM

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Client
TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

Project
A9 DUALLING PERTH TO INVERNESS

Drawing title
A9 LUNCARTY TO BIRNAM
SHOCHIE BURN
CULVERT EXTENSION
GENERAL ARRANGEMENT

Drawing status
PREMLINARY

Scale	AS SHOWN @ A1	DO NOT SCALE
Jacobs No.	B1557602	

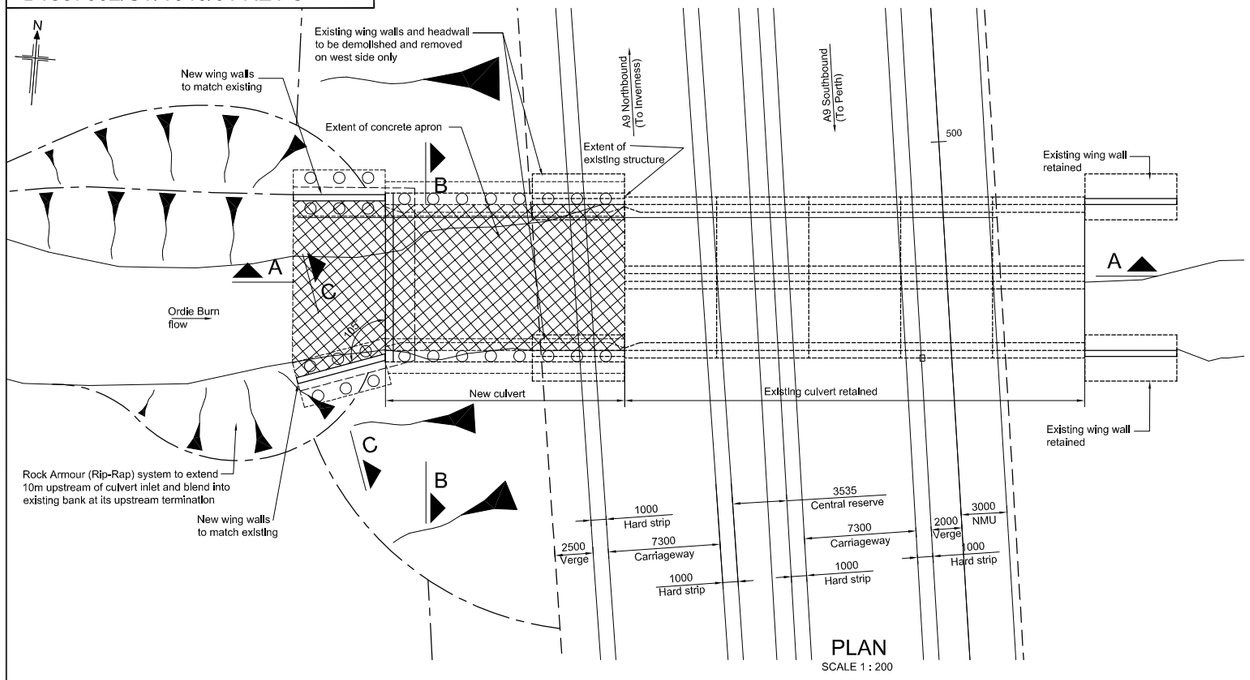
Drawing number
B1557602/ST/0730/01

Rev
3

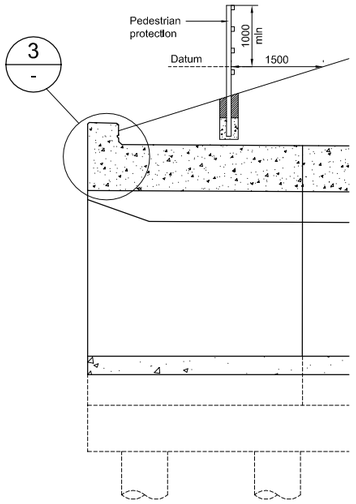
File: P:\Data3\B1557602 - A9 Dualling Luncarty to Pass of Birnam\CAD\1600 - Structures\Specimen Design\730 Shochie Burn\B1557602-ST-0730-01 REV 3.dwg Date: Dec 17, 2013 - 12:39pm Plotted by: collinn

Drawing number / Rev

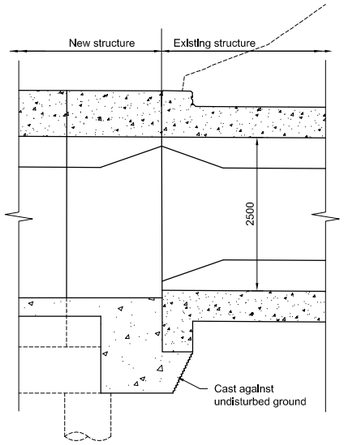
B1557602/ST/1640/01 REV 3



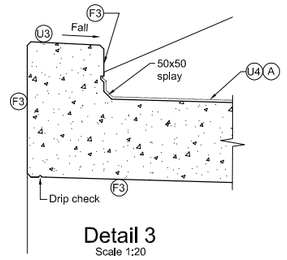
PLAN
SCALE 1 : 200



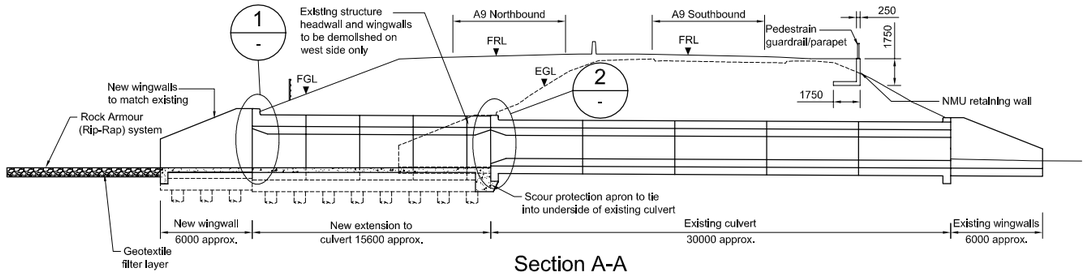
Detail 1
Scale 1:50



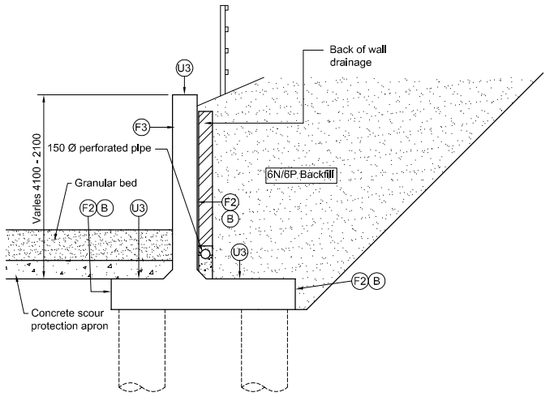
Detail 2
Scale 1:50



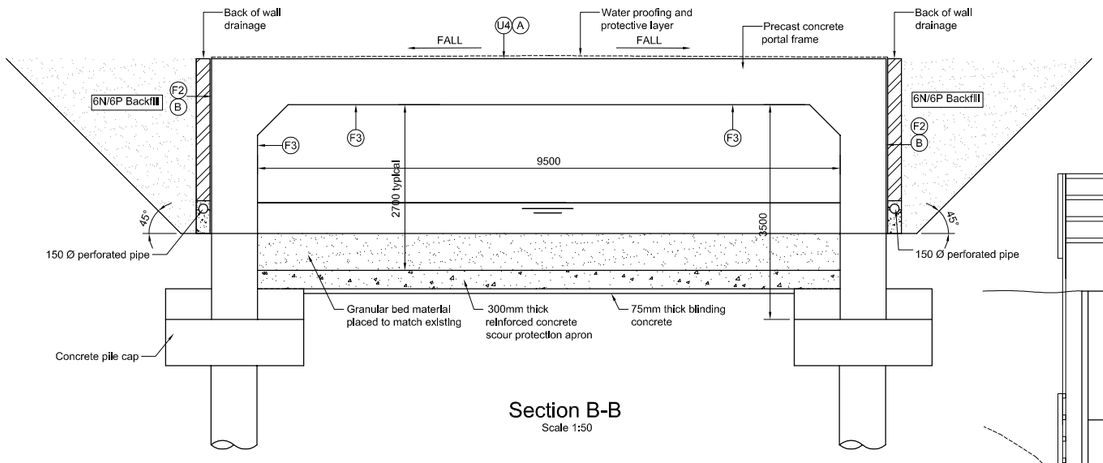
Detail 3
Scale 1:20



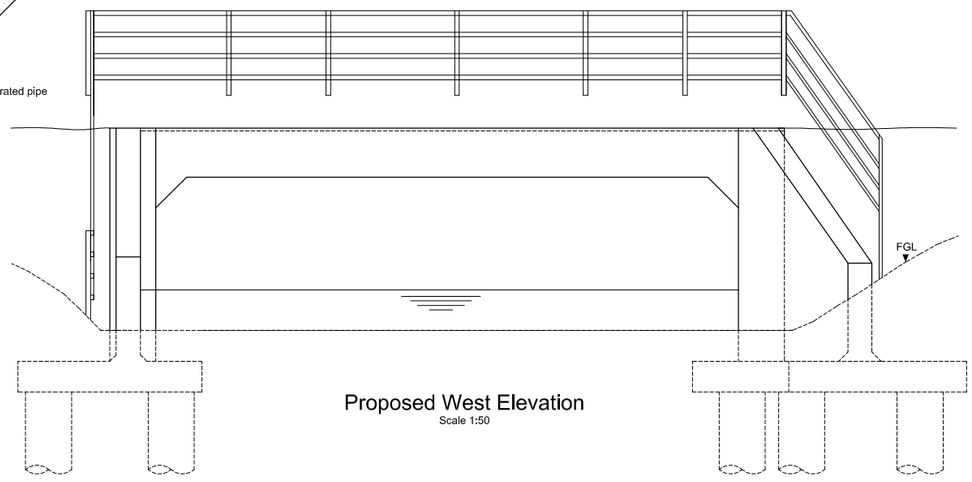
Section A-A
Scale 1:200



Section C-C
Scale 1:50



Section B-B
Scale 1:50



Proposed West Elevation
Scale 1:50

Notes.

1. All dimensions are in millimetres unless noted otherwise.
2. All levels and chainages in metres.
3. Concrete finishes denoted thus:
   - (F) - Formed
   - (U) - Unformed
4. Concrete protection to be as follows:
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   - (A) - Spray applied waterproofing in accordance with Cl 2003 of the Specification.
   - (B) - Waterproofing of all buried concrete surfaces in accordance with Cl 2004 of the Specification.
5. All details shown on this drawing are indicative only and subject to development at detailed design stage.
6. Foundations shown are indicative only and are to be confirmed.
7. Headroom within existing culvert varies due to natural deposition of bed material.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following :

CONSTRUCTION

- Service survey required pre-construction.
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- Inspection / testing of existing structure required pre-construction
- Position of structure may not be as shown
- Ecologically sensitive watercourse
- Waterproofing membrane on roof slab of existing sections of culvert may contain asbestos

MAINTENANCE / CLEANING

- Ecologically sensitive watercourse

DECOMMISSIONING / DEMOLITION

- Ecologically sensitive watercourse
- Waterproofing membrane on roof slab of existing sections of culvert may contain asbestos

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
3	December 2013	MINOR AMENDEMENTS MADE	NC	MAM	MAM	EM
2	November 2013	SCOUR PROTECTION ADDED AND MINOR AMENDEMENTS MADE	NC			
1	October 2013	MINOR AMENDEMENTS	NC	DG	DG	PMS
0	March 2013	PRELIMINARY ISSUE	PM	GDP	SF	MM

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Client

TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

Project

A9 DUALLING PERTH TO INVERNESS

Drawing title

A9 LUNCARTY TO BIRNAM ORDIE BURN CULVERT EXTENSION GENERAL ARRANGEMENT

Drawing status

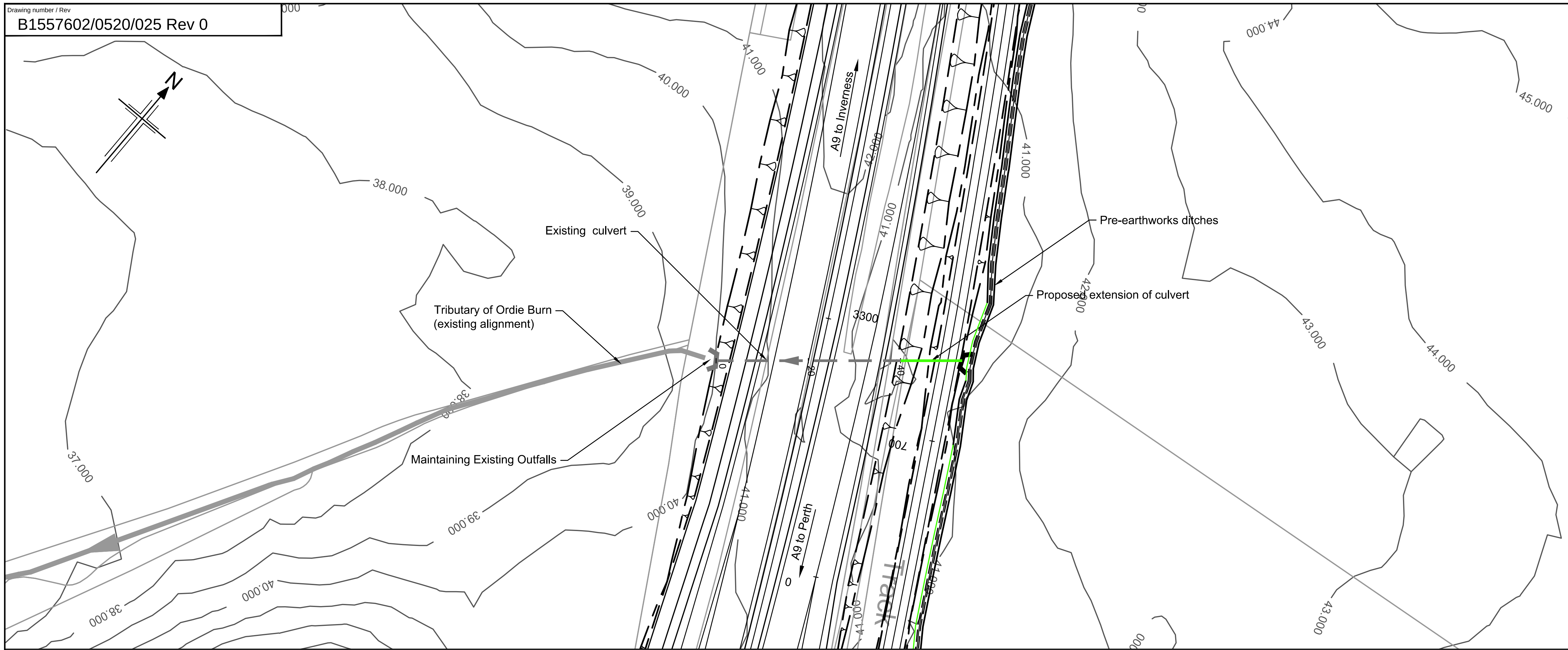
PRELIMINARY

Scale	AS SHOWN @ A1	DO NOT SCALE
Jacobs No.	B1557602	

Drawing number: B1557602/ST/1640/01 — Rev: 3

File: P:\Data3\B1557602 - A9 Dualling Luncarty to Pass of Birnam\CAD\1600 - Structures\Specimen Design\1640 Ordie Burn\B1557602-ST-1640-01 REV 3.dwg Date: Dec 17, 2013 - 12:44pm Plotted by: collinn

Drawing number / Rev
B1557602/0520/025 Rev 0



PLAN
Scale 1:1000

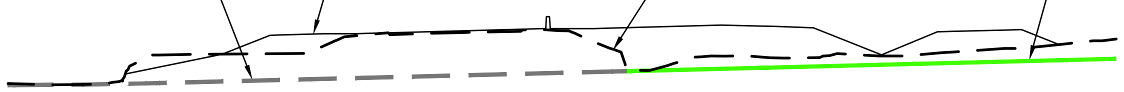
Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT



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Existing Road Level	38.091, 38.143, 39.000, 40.067, 40.174, 41.548, 40.424, 39.950, 39.914, 40.065, 40.809, 41.124
Proposed Road Level	40.133, 40.052, 40.019, 38.804, 40.116, 41.364, 41.385, 41.467, 41.472, 41.500, 41.578, 41.777, [illegible], 41.807, 41.811, 41.839, 42.037, 41.980, 41.957, 41.862, [illegible], 41.602, 41.627, 41.672, 41.716, 41.741, 40.807
Vertical	R=344.816m L=17.095m; G=2.537 L=64.183m
Chainage	0.000, 4.916, 9.111, 9.833, 10.000, 20.000, 30.000, 40.000, 50.000, 60.000, 70.000, 73.295

CULVERT NO. 2a LONGSECTION
Scale 1:500H, 1:500V

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	PSK	SF	GG	ELM

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Client: TRANSPORT SCOTLAND CÒMHDHAIL ALBA

Project: A9 DUALLING PERTH TO INVERNESS Luncarty to Pass of Birnam

Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.2a
UNNAMED TRIBUTARY 4 OF
ORDIE BURN

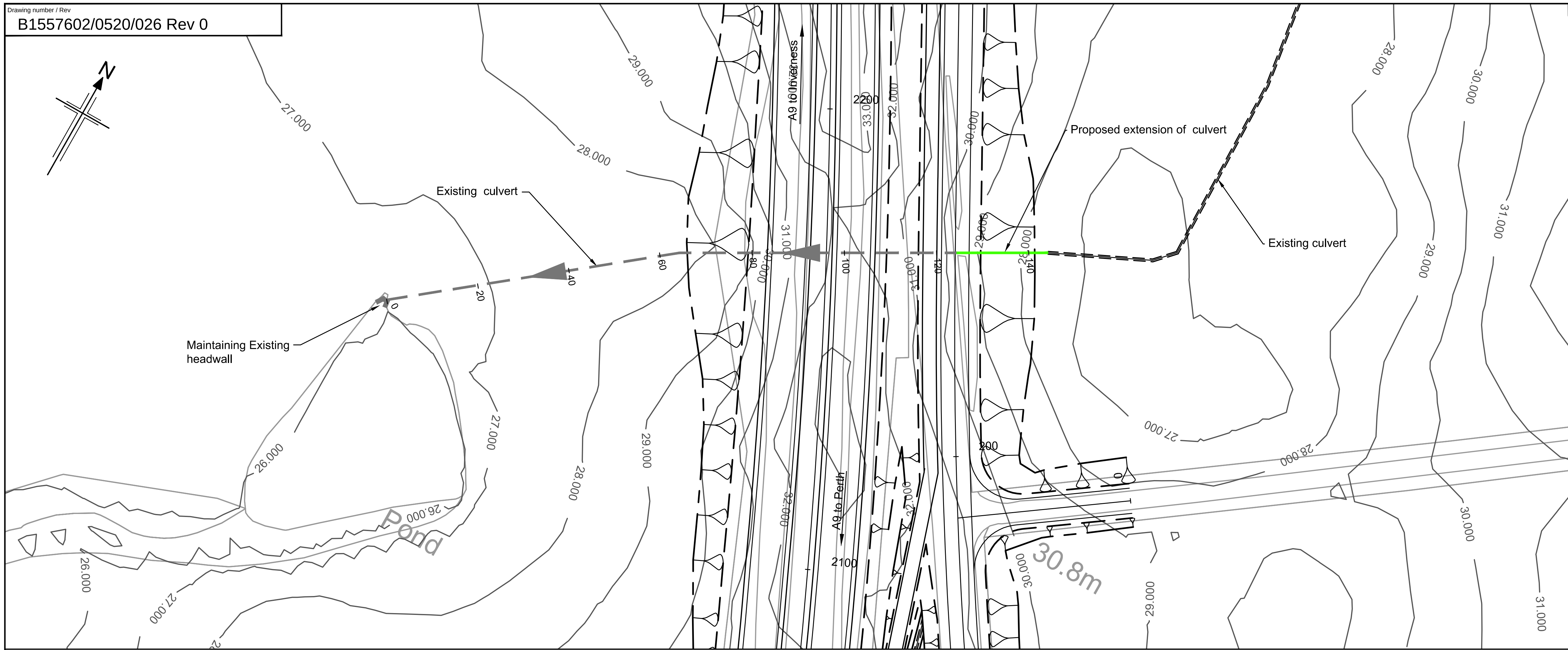
Drawing status: FOR INFORMATION

Scale: AS SHOWN @ A3 — DO NOT SCALE

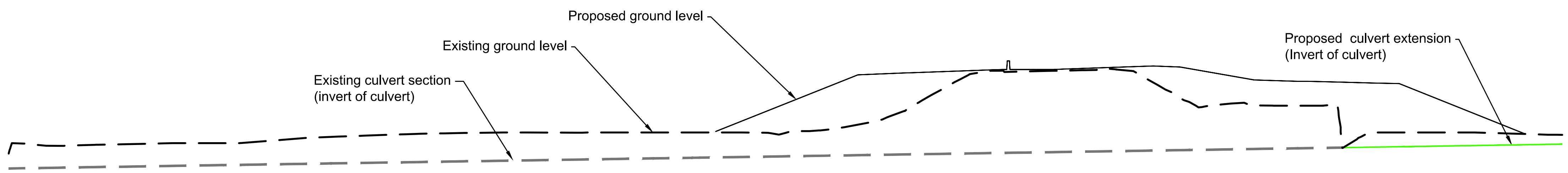
Jacobs No.: B1557602

Drawing number: B1557602/0520/025 — Rev 0

Drawing number / Rev
B1557602/0520/026 Rev 0



PLAN
Scale 1:1000



Level Datum = 20.000

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Existing Ground Level	26.507, 26.377, 26.500, 27.086, 27.409, 27.490, 27.500, 27.500, 27.474, 28.394, 33.042, 33.302, 30.318, 30.000, 26.077, 27.500, 27.500, 27.500, 27.394, 27.280
Proposed Ground Level	27.591, 32.876, 33.043, 33.078, 33.336, 33.371, 34.171, 33.371, 33.372, 33.372, 33.408, 33.665, 33.700, 33.601, 32.392, 32.367, 32.267, 32.267, 32.191, 32.116, 32.053, 27.370
Vertical	G=1.567 L=149.356m
Chainage	0.000, 10.000, 20.000, 30.000, 40.000, 50.000, 60.000, 63.652, 64.356, 70.000, 80.000, 90.000, 100.000, 110.000, 120.000, 130.000, 140.000

CULVERT NO. 2b LONGSECTION
Scale 1:500H, 1:500V

Legend:
- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:
1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	TF	SF	GG	ELM

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Client
TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

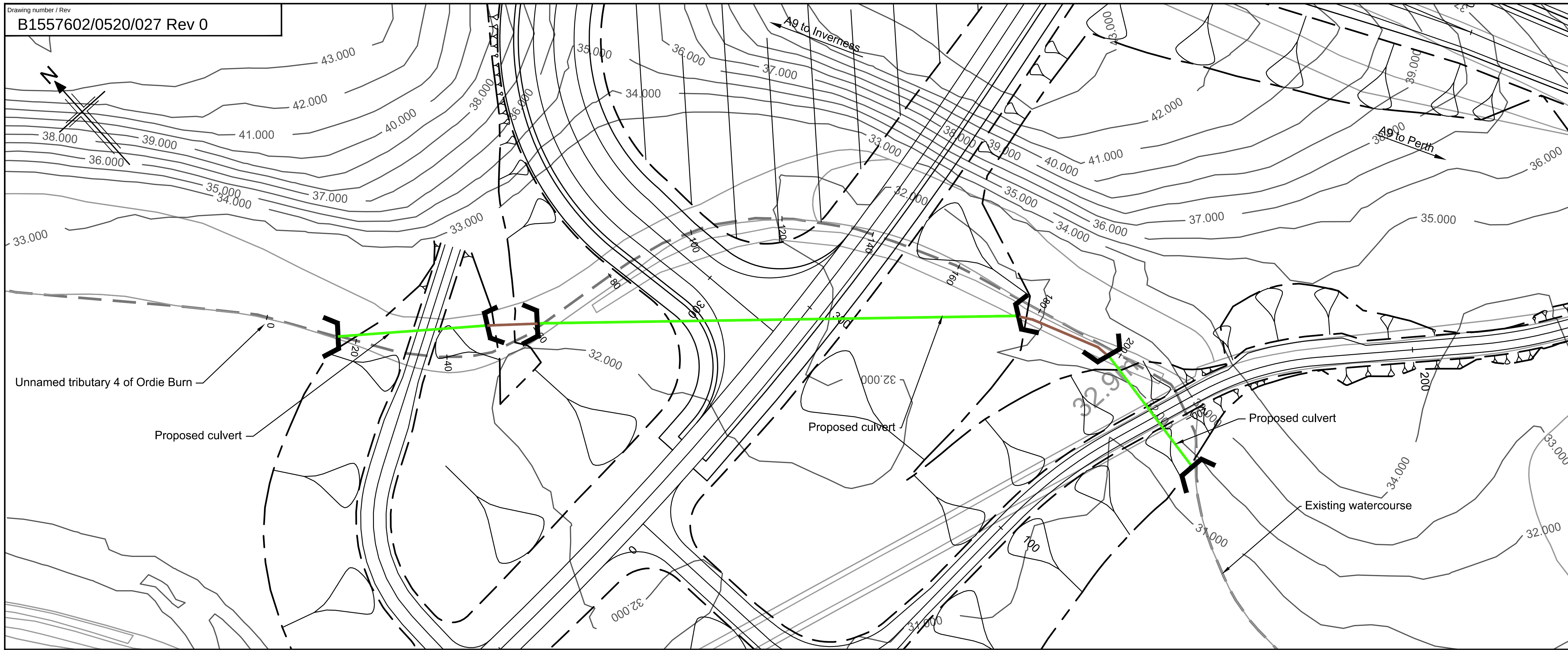
Project
A9 DUALLING PERTH TO INVERNESS

Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.2b
UNNAMED TRIBUTARY 3 OF
ORDIE BURN

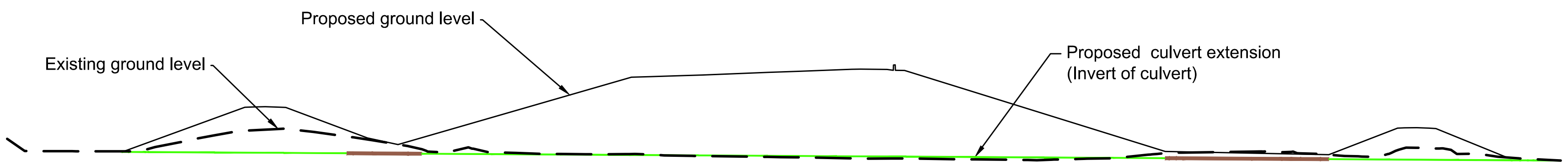
Drawing status
FOR INFORMATION

Scale	AS SHOWN @ A3	DO NOT SCALE
Jacobs No.	B1557602	
Drawing number	B1557602/0520/026	Rev 0

Drawing number / Rev
B1557602/0520/027 Rev 0



PLAN
Scale 1:1000



Level Datum = 25.000

Invert Level	34.662 33.542 32.829 32.825 32.795 32.780 32.765 32.763 32.705 32.645 32.585 32.568 32.537 32.525 32.465 32.405 32.345 32.285 32.225 32.165 32.105 32.045 31.985 31.925 31.883 31.877 31.871 31.865 31.805 31.779 31.771 31.763 31.745 31.685 31.625 31.580 31.573 31.567 31.561 31.537
Existing Ground Level	34.663 32.900 32.872 34.182 35.815 36.140 35.666 32.934 33.440 32.631 32.449 32.282 32.076 31.817 31.706 31.585 31.877 32.686 32.839 32.050 33.287 31.947 31.532
Proposed Ground Level	34.874 39.231 39.208 34.788 33.854 43.558 43.883 44.414 44.714 44.531 32.858 32.378 36.217 36.162 31.991
Horizontal	L=15.000m R=-15.000m L=5.415m L=32.487m R=75.000m L=5.144m L=109.062m R=5.000m L=2.009m L=15.279m R=5.000m L=2.671m L=30.486m R=5.000m L=3.162m L=4.000m
Vertical	L=4.194m G=-26.705 R=20.000m L=5.221m L=215.300m G=-0.600
Chainage	0.000 4.194 9.415 10.000 15.000 17.500 20.000 20.415 30.000 40.000 50.000 52.902 58.046 60.000 70.000 80.000 90.000 100.000 110.000 120.000 130.000 140.000 150.000 160.000 167.108 168.112 169.117 170.000 180.000 184.395 185.731 187.066 190.000 200.000 210.000 217.553 218.776 220.000 220.715 224.715

CULVERT NO. 2c LONGSECTION
Scale 1:1000H, 1:1000V

Legend:
- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:
1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	TF	SF	GG	ELM

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Client
TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

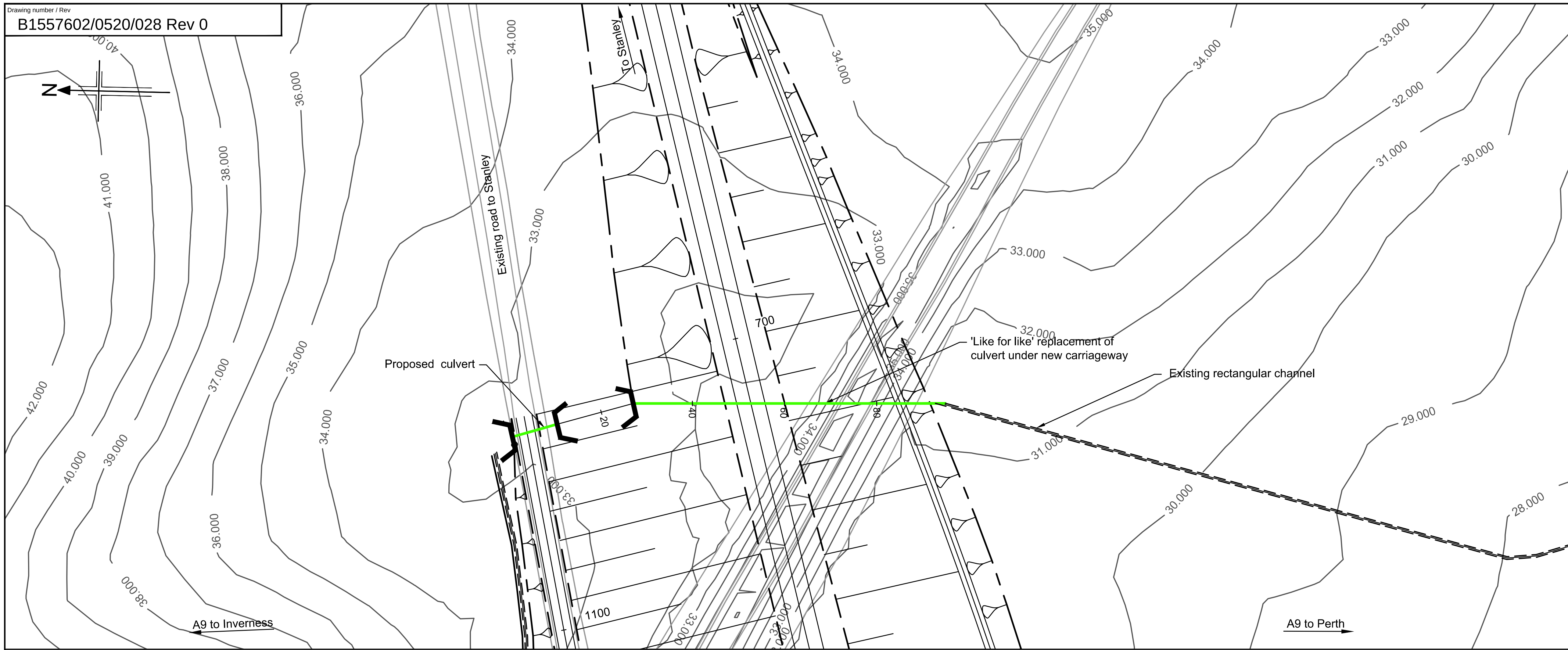
Project
A9 DUALLING
PERTH TO INVERNESS
Luncarty to Pass of Birnam

Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No. 2c
UNNAMED TRIBUTARY 4 OF
ORDIE BURN BY NEWMILL

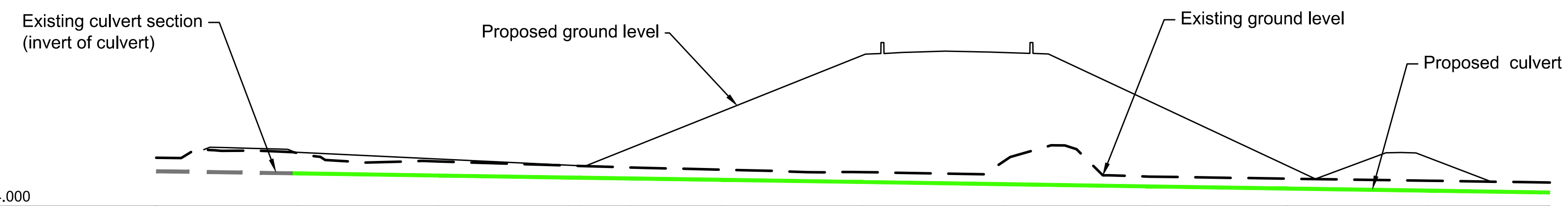
Drawing status
FOR INFORMATION

Scale: AS SHOWN @ A3 — DO NOT SCALE
Jacobs No.: B1557602
Drawing number: B1557602/0520/027 — Rev: 0

Drawing number / Rev
B1557602/0520/028 Rev 0



PLAN
Scale 1:1000



Level Datum = 114.000

Invert Level	31.500, 31.348, 31.196, 31.056, 31.044, 30.989, 30.891, 30.739, 30.587, 30.435, 30.283, 30.131, 30.000
Existing Ground Level	32.455, 32.429, 32.975, 32.780, 32.516, 32.227, 32.140, 31.870, 31.765, 31.529, 31.437, 32.230, 33.314, 31.212, 31.131, 31.121, 30.978, 30.830, 30.703
Proposed Ground Level	33.021, 33.195, 33.168, 33.120, 33.073, 33.046, 32.845, 31.870, 39.747, 39.959, 39.765, 30.953, 32.797, 32.786, 30.771
Vertical	L=98.587m G=-1.522
Chainage	0.000, 10.000, 20.000, 29.160, 30.000, 33.587, 40.000, 50.000, 60.000, 70.000, 80.000, 90.000, 98.587

CULVERT NO. 2d LONGSECTION
Scale 1:500H, 1:500V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	TF	SF	GG	ELM

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CÒMHDHAIL ALBA

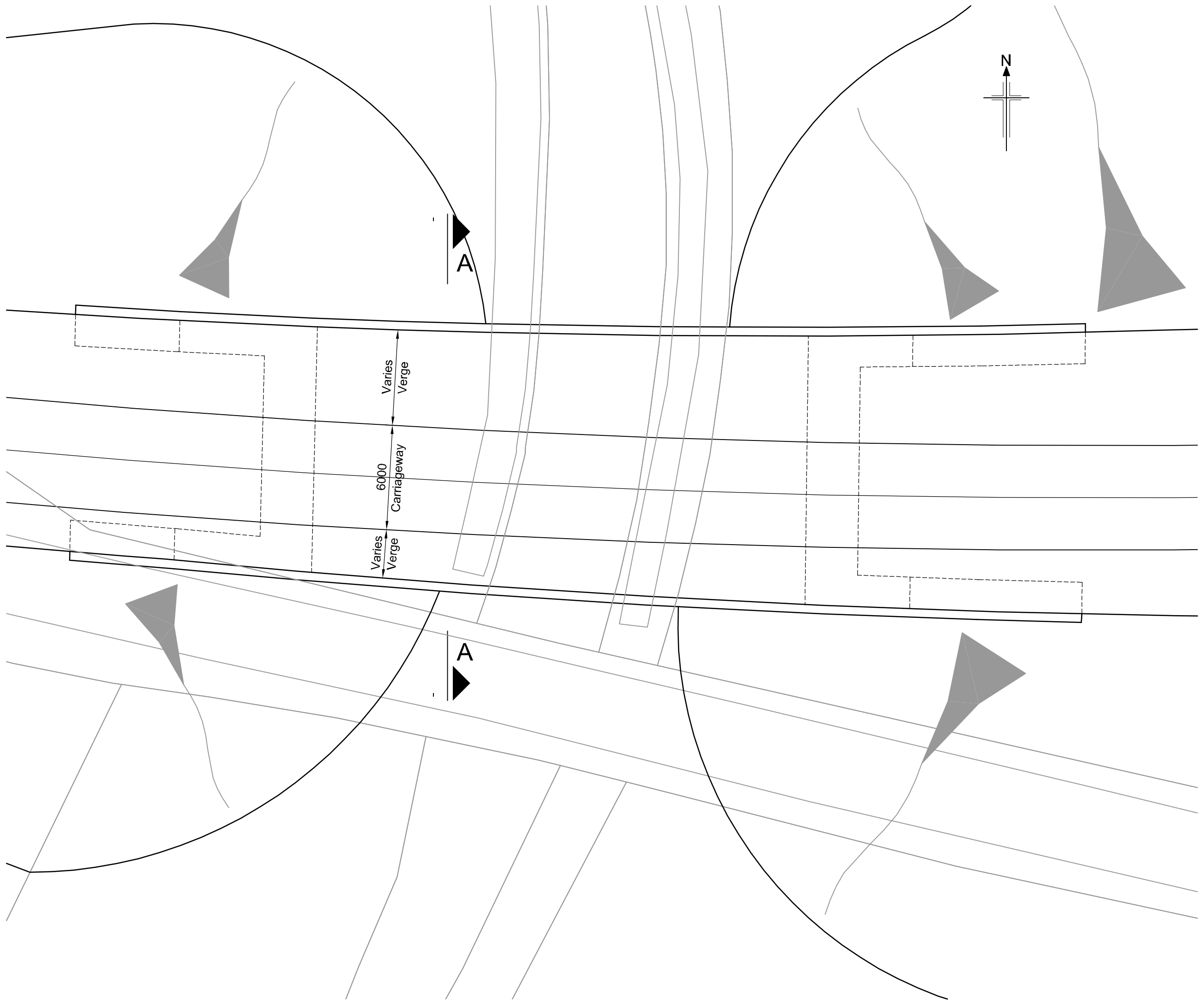
Project
A9 DUALLING PERTH TO INVERNESS
Luncarty to Pass of Birnam

Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.2d
UNNAMED TRIBUTARY OF
ORDIE BURN

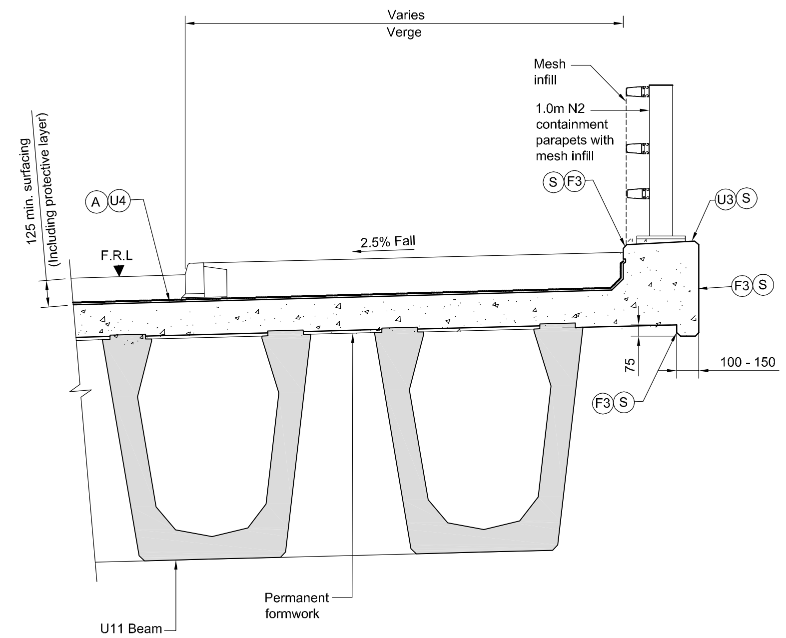
Drawing status
FOR INFORMATION

Scale	AS SHOWN @ A3	DO NOT SCALE
Jacobs No.	B1557602	
Drawing number	B1557602/0520/028	Rev 0

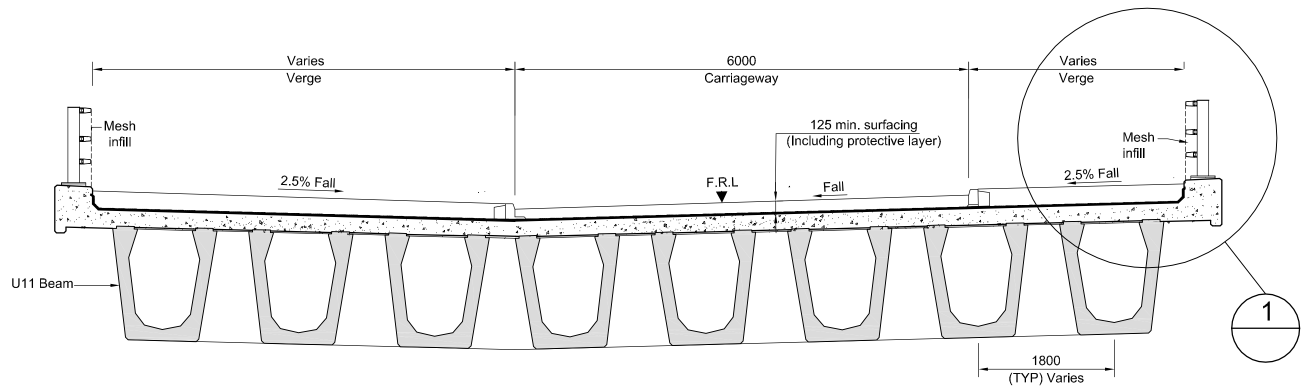
Drawing number / Rev
B1557602/ST/3030/01 REV 2



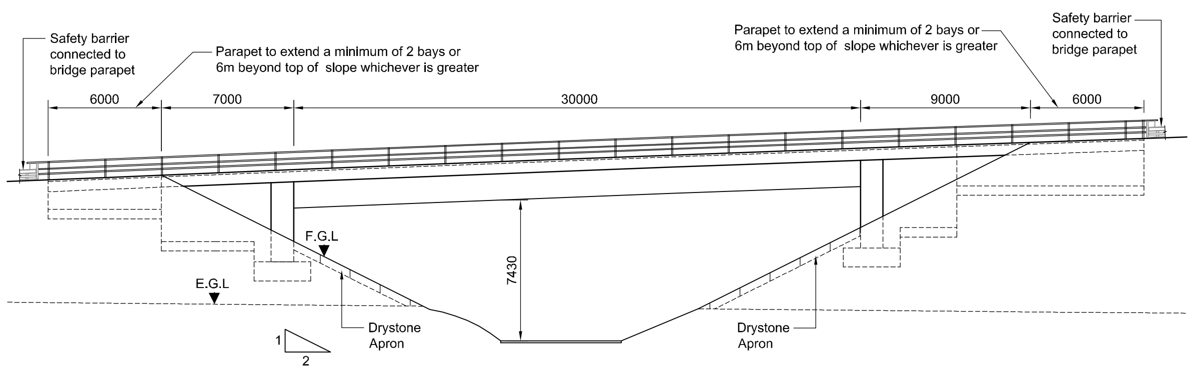
PLAN
SCALE 1 : 200



DETAIL 1
Scale 1:25



SECTION A/-
SCALE 1 : 50



SOUTH ELEVATION
Scale 1:200

Notes.

1. All dimensions are in millimetres unless noted otherwise.
2. All levels and chainages in metres.
3. Concrete finishes denoted thus:
   - (F) - Formed
   - (U) - Unformed
4. Concrete protection to be as follows:
   - (S) - Surface impregnation in accordance with Cl 1709 of the Specification.
   - (A) - Spray applied waterproofing in accordance with Cl 2003 of the Specification.
   - (B) - Waterproofing of all buried concrete surfaces in accordance with Cl 2004 of the Specification.
5. All details shown on this drawing are indicative only and subject to development at detailed design stage.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following :

CONSTRUCTION
- Service survey required pre-construction
- Nature and position of the existing structure foundations to be verified pre-construction by undertaking investigations
- Inspection / testing of existing structure required pre-construction

MAINTENANCE / CLEANING
- None

DECOMMISSIONING / DEMOLITION
- None

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
2	November 2013	MINOR AMENDEMENTS	NC	MAM	MAM	EM
1	October 2013	MINOR AMENDEMENTS	NC	DG	DG	PMS
0	October 2013	PRELIMINARY ISSUE	PM	GDP	SF	MM

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Client
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CÒMHDHAIL ALBA

Project
A9 DUALLING
PERTH TO INVERNESS

Drawing title
A9 LUNCARTY TO BIRNAM
NEW ORDIE BURN BRIDGE
GENERAL ARRANGEMENT

Drawing status
PRELIMINARY

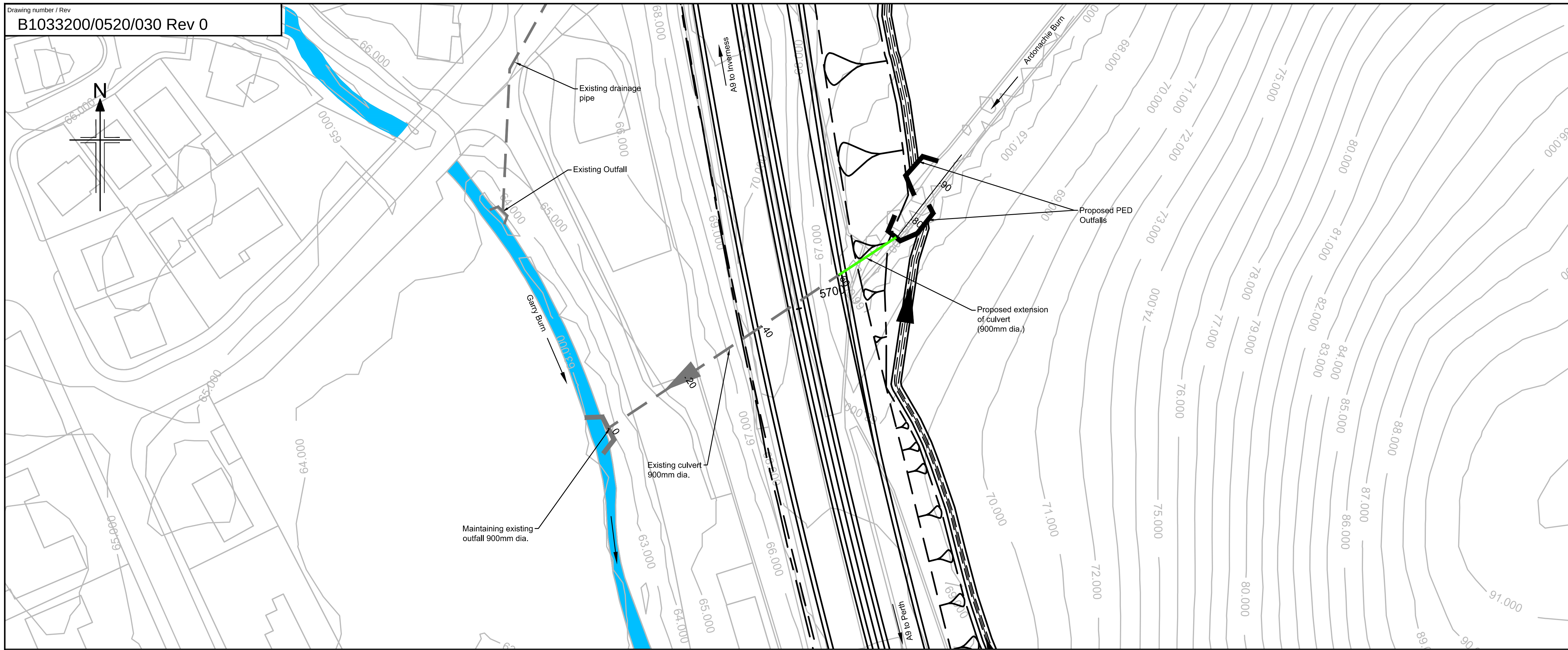
Scale	AS SHOWN @ A1	DO NOT SCALE
Jacobs No.	B1557602	

Drawing number: B1557602/ST/3030/01
Rev: 2

This drawing is not to be used in whole or part other than for the intended purpose and project as defined on this drawing. Refer to the contract for full terms and conditions.

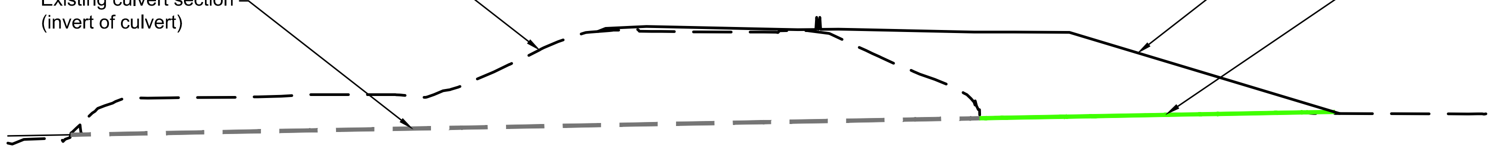
Drawing number / Rev

B1033200/0520/030 Rev 0



PLAN

Scale 1:1000



Level Datum = 61.000

Invert Level	62.266, 62.447, 62.629, 62.810, 62.992, 63.173, 63.355, 63.421, 63.440, 63.459, 63.534, 63.536, 63.567, 63.657, 63.698, 63.718, 63.790, 63.820, 63.825, 63.870, 63.819
Proposed Ground Level	69.178, 69.375, 69.505, 69.482, 69.315, 69.292, 69.306, 69.309, 69.323, 69.300, 69.137, 69.131, 69.136, 69.115, 63.948
Existing Ground Level	61.722, 62.129, 64.769, 64.888, 64.813, 69.103, 69.143, 69.129, 69.039, 64.012, 63.640, 63.790, 63.739, 63.718
Vertical	G=1.815 L=85.613m; R=-333.333m
Chainage	0.000, 10.000, 20.000, 30.000, 40.000, 50.000, 60.000, 63.670, 64.712, 65.753, 69.893, 70.000, 71.682, 76.633, 78.912, 80.000, 83.955, 85.613, 85.927, 90.000, 97.765

ARDONACHIE BURN CULVERT LONGSECTION

Scale 1:500H, 1:500V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For information	TF	SF	GG	ELM

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Client

TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

Project

A9 DUALLING PERTH TO INVERNESS
Luncarty to Pass of Birnam

Drawing title

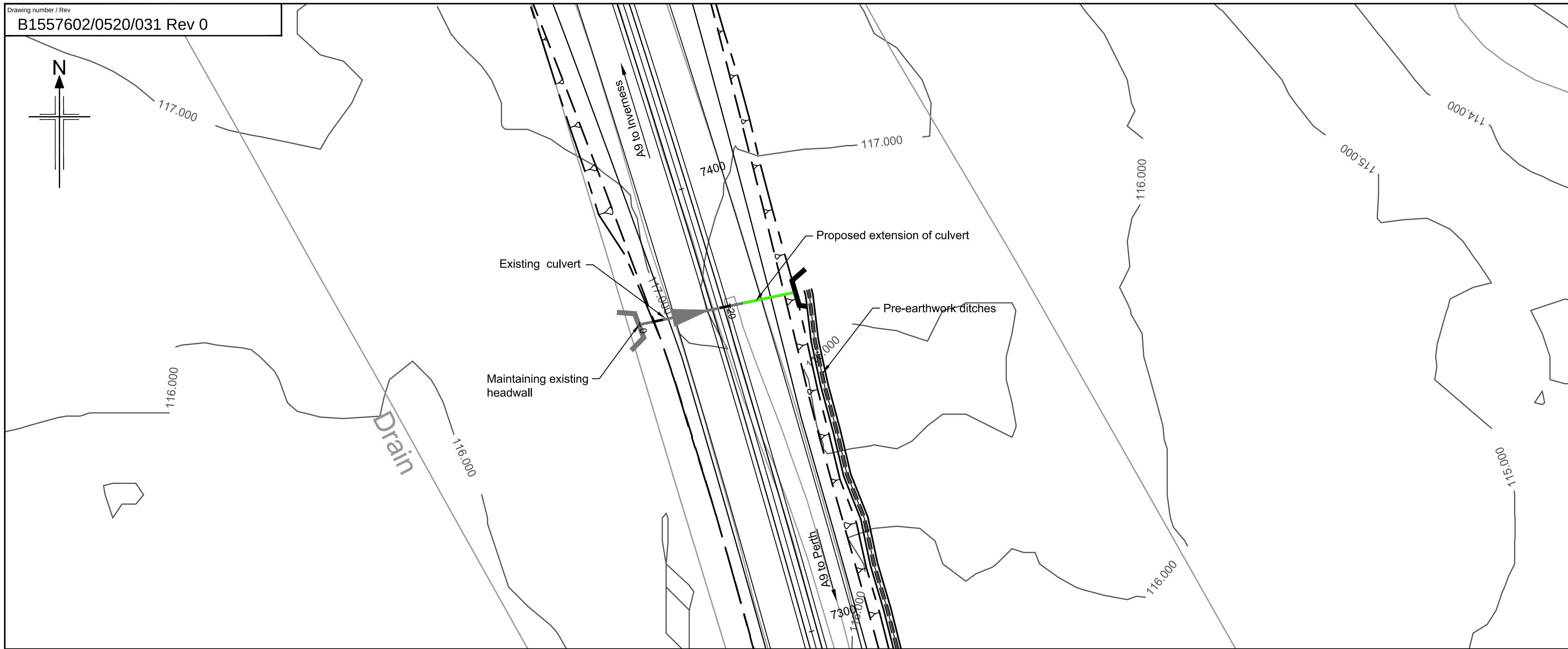
LUNCARTY TO PASS OF BIRNAM
EXTENSION OF CULVERT No.3
ARDONACHIE BURN

Drawing status

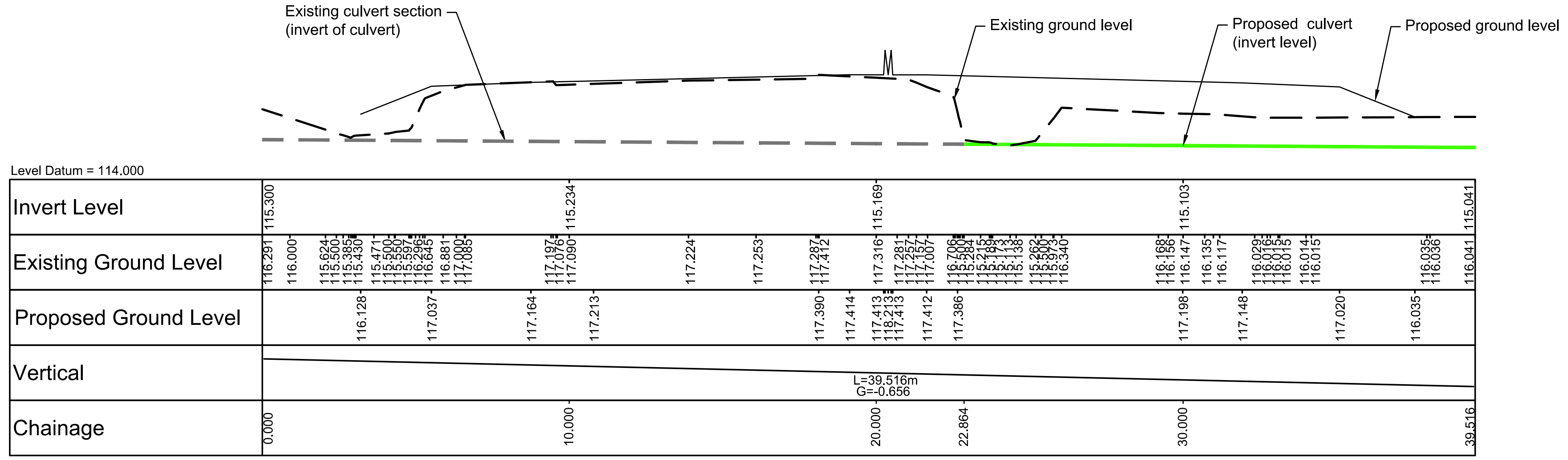
FOR INFORMATION

Scale	AS SHOWN @ A3	DO NOT SCALE
Jacobs No.	B1033200	
Drawing number	B1033200/0520/030	Rev 0

Drawing number / Rev
B1557602/0520/031 Rev 0



PLAN
Scale 1:1000



CULVERT NO. 4 LONGSECTION
Scale 1:200H, 1:200V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	SAS	SF	GG	ELM

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CÒMHDHAIL ALBA

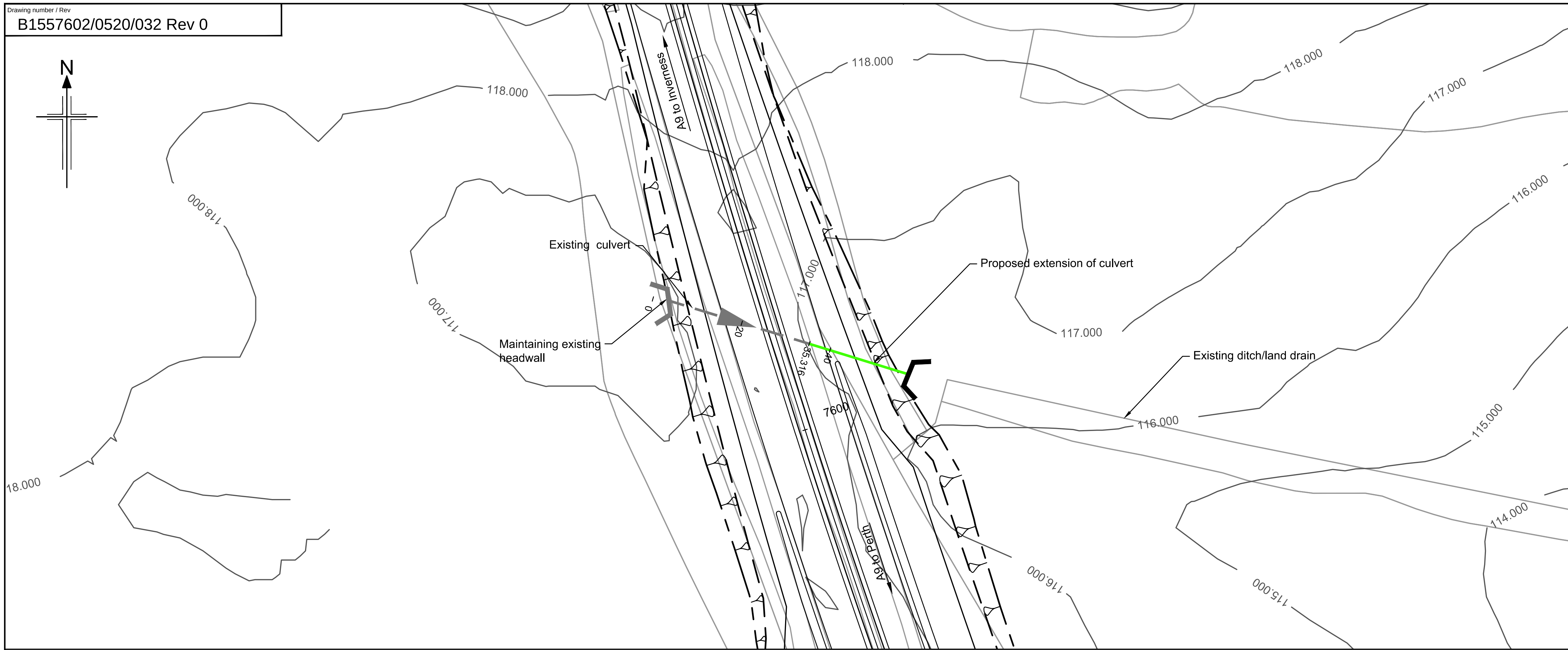
Project
A9 DUALLING
PERTH TO INVERNESS

Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.4
UNNAMED DRAIN 3

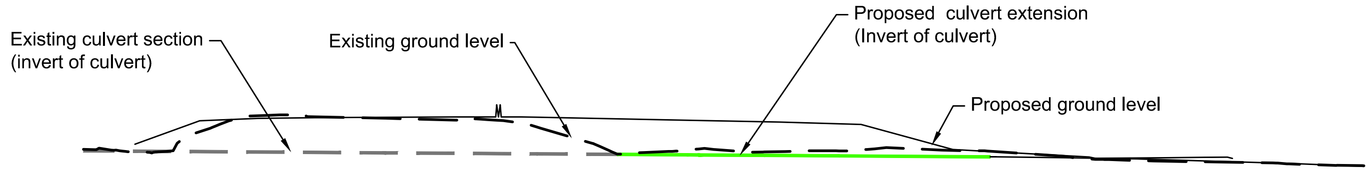
Drawing status
FOR INFORMATION

Scale	AS SHOWN @ A3	DO NOT SCALE
Jacobs No.	B1557602	
Drawing number	B1557602/0520/031	Rev 0

Drawing number / Rev
B1557602/0520/032 Rev 0



PLAN
Scale 1:1000



Level Datum = 110.000

Invert Level	116.000, 115.959, 115.956, 115.933, 115.866, 115.799, 115.732, 115.727, 115.698, 115.665, 115.599, 115.598, 115.551, 115.510, 115.460, 115.454, 115.159, 114.968
Existing Ground Level	
Proposed Ground Level	116.438, 117.991, 118.153, 118.203, 118.246, 118.246, 118.247, 118.247, 118.248, 118.224, 118.046, 117.911, 117.752, 116.084, 115.595, 115.508, 115.520, 115.543, 115.566, 115.579, 115.492
Vertical	L=59.828m G=-0.670; R=-666.667m
Chainage	0.000, 6.084, 6.531, 10.000, 20.000, 30.000, 40.000, 40.697, 45.043, 50.000, 59.828, 60.000, 64.531, 67.126, 69.720, 70.000, 80.000, 84.720

CULVERT NO. 5 LONGSECTION
Scale 1:500H, 1:500V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	PSK	SF	GG	ELM

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Client
TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

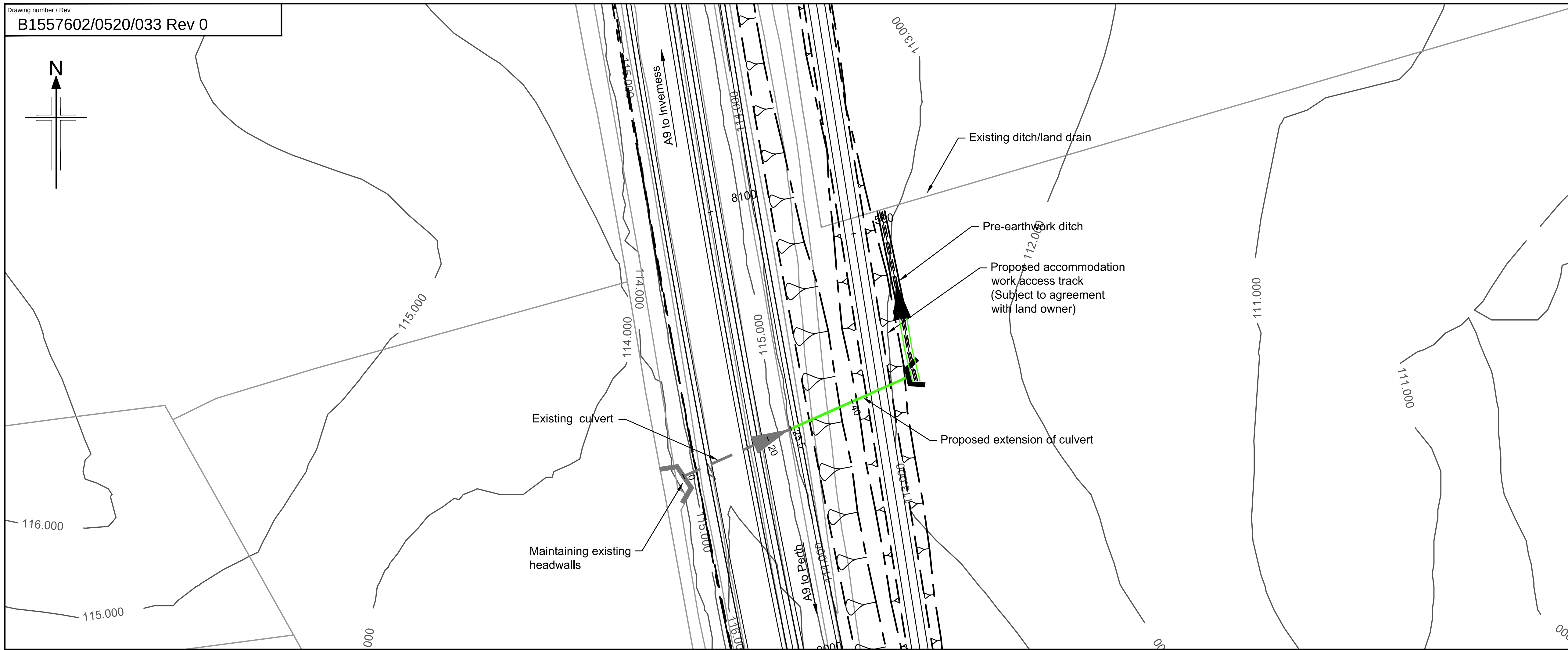
Project
A9 DUALLING PERTH TO INVERNESS

Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.5
UNNAMED DRAIN 4

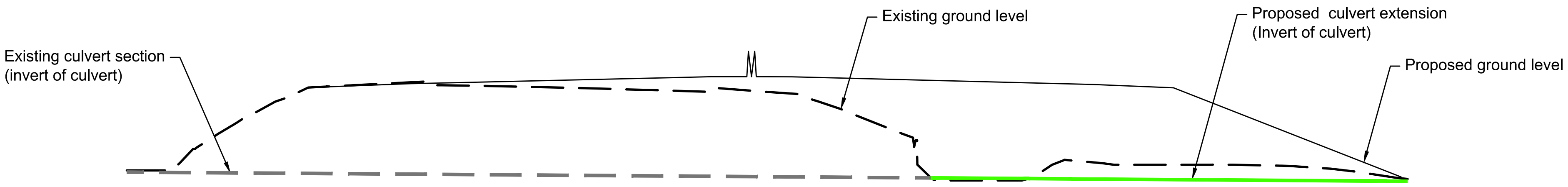
Drawing status
FOR INFORMATION

Scale	AS SHOWN @ A3 — DO NOT SCALE
Jacobs No.	B1557602
Drawing number	B1557602/0520/032
Rev	0

Drawing number / Rev
B1557602/0520/033 Rev 0



PLAN
Scale 1:1000



Level Datum = 110.000

Invert Level	113.270, 113.199, 113.127, 113.056, 112.985
Existing Ground Level	113.323, 113.323, 113.323, 113.420, 113.627, 114.000, 114.039, 114.450, 114.500, 114.827, 115.000, 115.159, 115.500, 115.634, 115.650, 115.945, 115.960, 116.000, 116.012, 116.016, 116.143, 116.015, 116.000, 115.956, 115.935, 115.923, 115.810, 115.934, 115.832, 115.778, 115.735, 115.560, 115.500, 115.264, 115.000, 114.529, 114.488, 114.284, 113.500, 113.069, 113.005, 113.005, 113.005, 113.005, 113.005, 113.141, 113.500, 113.643, 113.637, 113.576, 113.551, 113.500, 113.500, 113.500, 113.500, 113.508, 113.500, 113.481, 113.472, 113.465, 113.377, 113.265, 113.138, 113.085, 113.080
Proposed Ground Level	116.006, 115.968, 116.065, 116.089, 116.263, 116.287, 116.285, 117.085, 116.285, 116.284, 116.257, 116.066, 116.040, 115.937, 113.115
Vertical	L=43.829m G=-0.713
Chainage	0.000, 10.000, 20.000, 30.000, 40.000

CULVERT 5a LONGSECTION
Scale 1:200H, 1:200V

Legend:
- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:
1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	SAS	SF	GG	ELM

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Client
TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

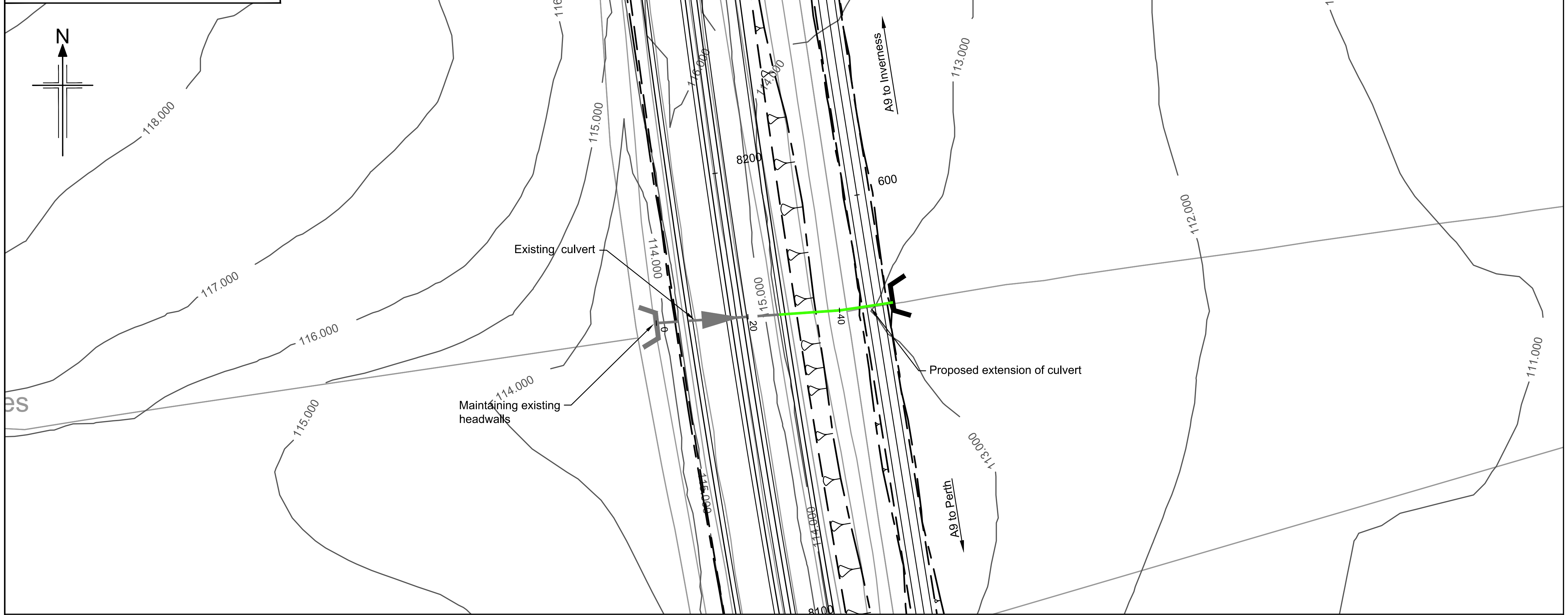
Project
A9 DUALLING PERTH TO INVERNESS

Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.5a
UNNAMED TRIBUTARY 1 OF
GELLY BURN

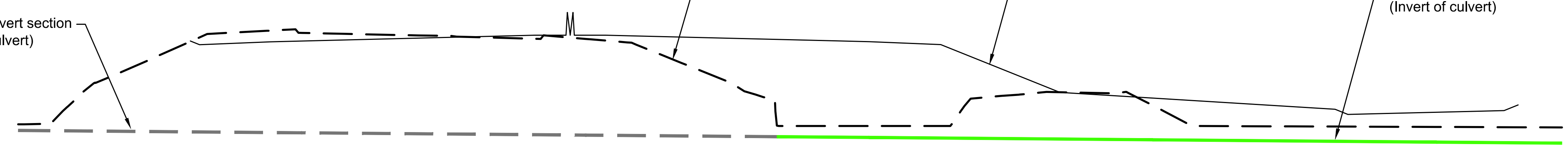
Drawing status
FOR INFORMATION

Scale	AS SHOWN @ A3	DO NOT SCALE
Jacobs No.	B1557602	
Drawing number	B1557602/0520/033	Rev 0

Drawing number / Rev
B1557602/0520/034 Rev 0



PLAN
Scale 1:1000



Level Datum = 110.000

Invert Level	112.330, 112.248, 112.166, 112.084, 112.002, 111.920, 111.883
Existing Ground Level	112.544, 114.000, 115.722, 115.759, 115.728, 115.628, 115.672, 115.548, 115.414, 112.486, 112.486, 112.486, 113.448, 113.683, 113.684, 112.486, 112.472, 112.453, 112.437
Proposed Ground Level	115.474, 115.344, 115.444, 115.470, 115.653, 115.678, 115.679, 115.679, 115.679, 115.679, 115.654, 115.473, 115.448, 115.348, 113.669, 113.074, 112.893, 112.918, 112.962, 113.005, 113.030, 113.229
Vertical	L=54.429m G=-0.820
Chainage	0.000, 10.000, 20.000, 26.753, 30.000, 40.000, 50.000, 54.429

CULVERT NO. 6 LONGSECTION
Scale 1:200H, 1:200V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	PSK	SF	GG	ELM

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Client
TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

Project
A9 DUALLING PERTH TO INVERNESS
Luncarty to Pass of Birnam

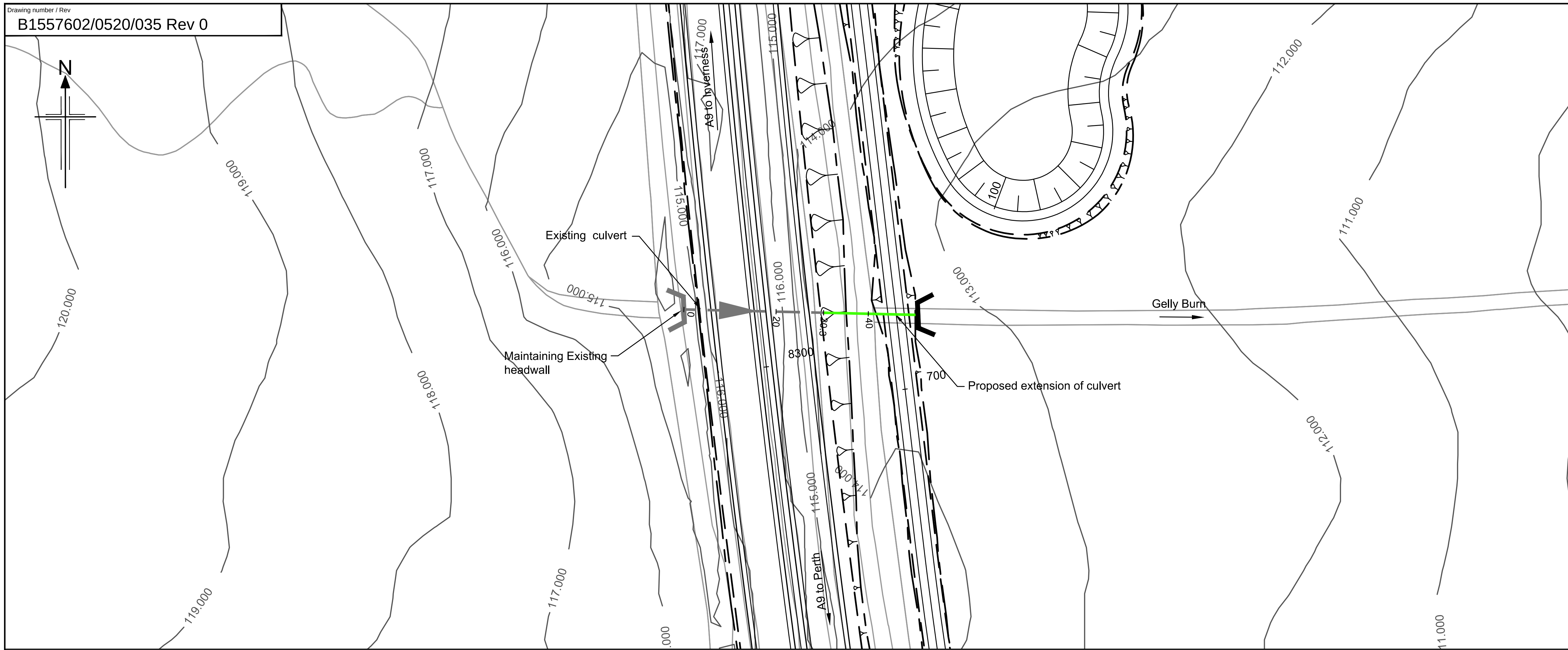
Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.6
UNNAMED TRIBUTARY 2 OF
GELLY BURN

Drawing status
FOR INFORMATION

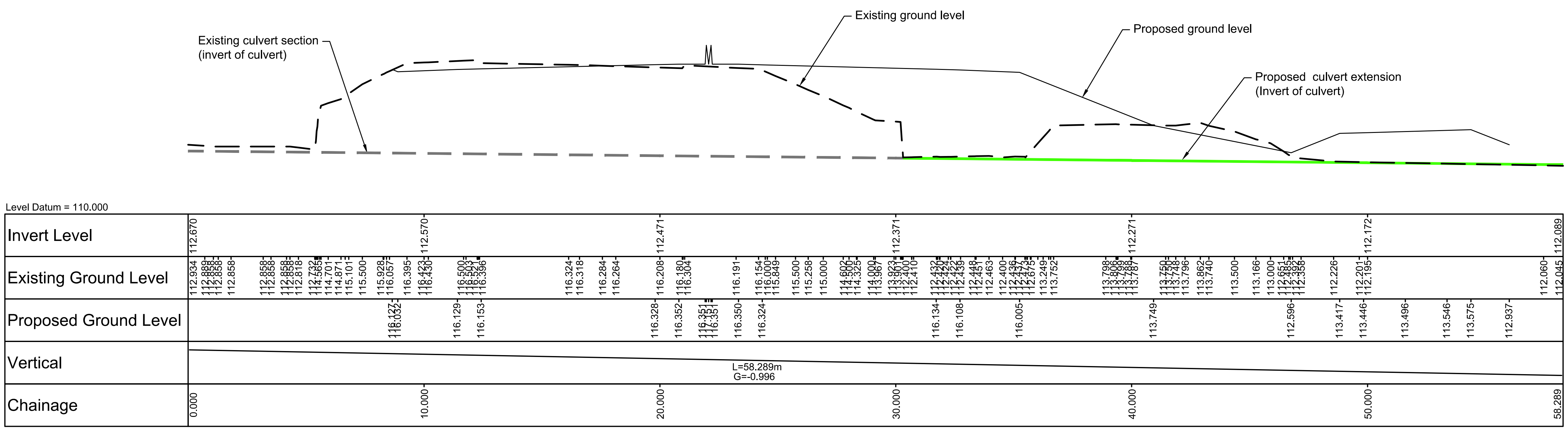
Scale	AS SHOWN @ A3	DO NOT SCALE
Jacobs No.	B1557602	

Drawing number: B1557602/0520/034
Rev: 0

Drawing number / Rev
B1557602/0520/035 Rev 0



PLAN
Scale 1:1000



CULVERT NO. 7 LONGSECTION
Scale 1:200H, 1:200V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	TF	SF	GG	ELM

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Client
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CÒMHDHAIL ALBA

Project
A9 DUALLING PERTH TO INVERNESS

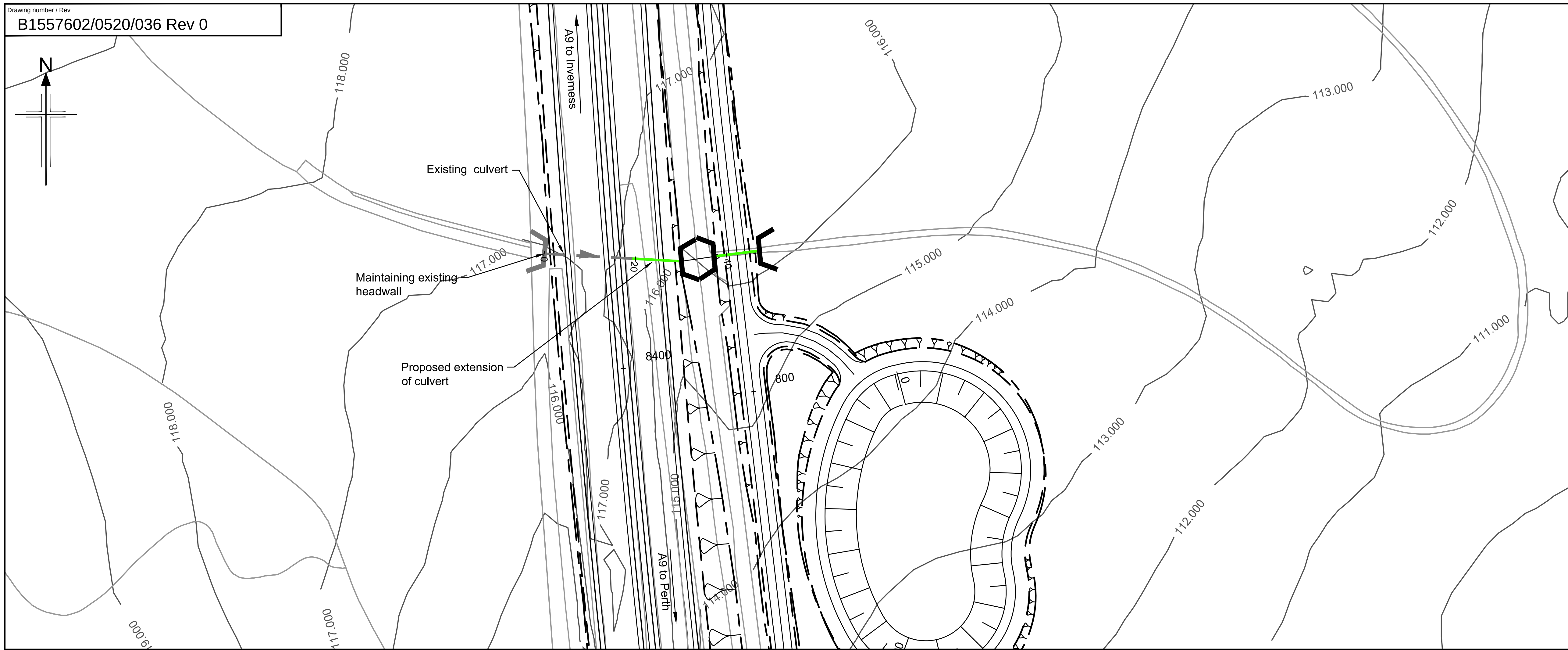
Drawing title

LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.7
GELLY BURN - NORTH

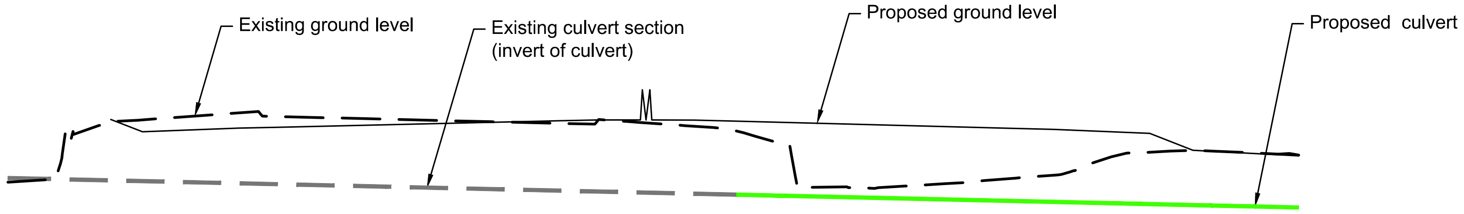
Drawing status
FOR INFORMATION

Scale	AS SHOWN @ A3	DO NOT SCALE
Jacobs No.	B1557602	
Drawing number	B1557602/0520/035	Rev 0

Drawing number / Rev
B1557602/0520/036 Rev 0



PLAN
Scale 1:1000



Level Datum = 114.000

Invert Level	115.610, 115.381, 115.152, 114.923, 114.882, 114.855
Existing Ground Level	115.498, 115.580, 116.789, 116.765, 117.001, 117.109, 117.144, 117.376, 117.251, 117.171, 117.102, 117.038, 117.163, 117.111, 117.084, 117.000, 116.959, 116.950, 116.925, 116.814, 116.651, 116.500, 116.000, 115.359, 115.376, 115.353, 115.334, 115.355, 115.377, 115.398, 115.461, 115.500, 115.543, 115.601, 115.636, 115.690, 115.770, 115.811, 116.000, 116.170, 116.271, 116.281, 116.324, 116.347, 116.327, 116.275, 116.247, 116.261
Proposed Ground Level	117.165, 116.836, 116.933, 116.956, 117.127, 117.151, 117.149, 117.949, 117.149, 117.147, 117.121, 116.927, 116.900, 116.797, 116.347
Vertical	L=49.926m G=-2.289
Chainage	0.000, 10.000, 20.000, 30.000, 31.832, 32.986, 34.140

CULVERT NO. 08 LONGSECTION
Scale 1:200H, 1:200V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	TF	SF	GG	ELM

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Client
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Project
A9 DUALLING PERTH TO INVERNESS
Luncarty to Pass of Birnam

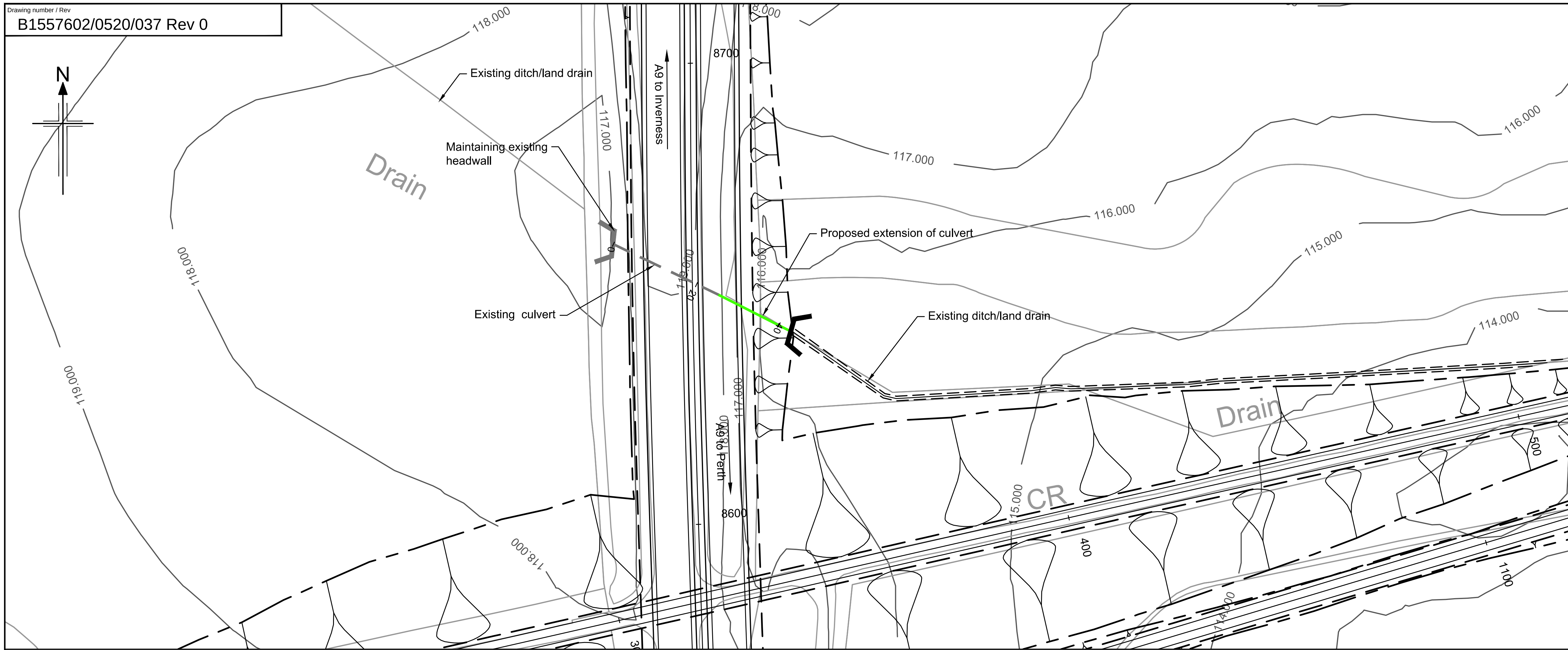
Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.08
UNNAMED DRAIN 5

Drawing status
FOR INFORMATION

Scale	AS SHOWN @ A3	DO NOT SCALE
Jacobs No.	B1557602	
Drawing number	B1557602/0520/036	Rev 0

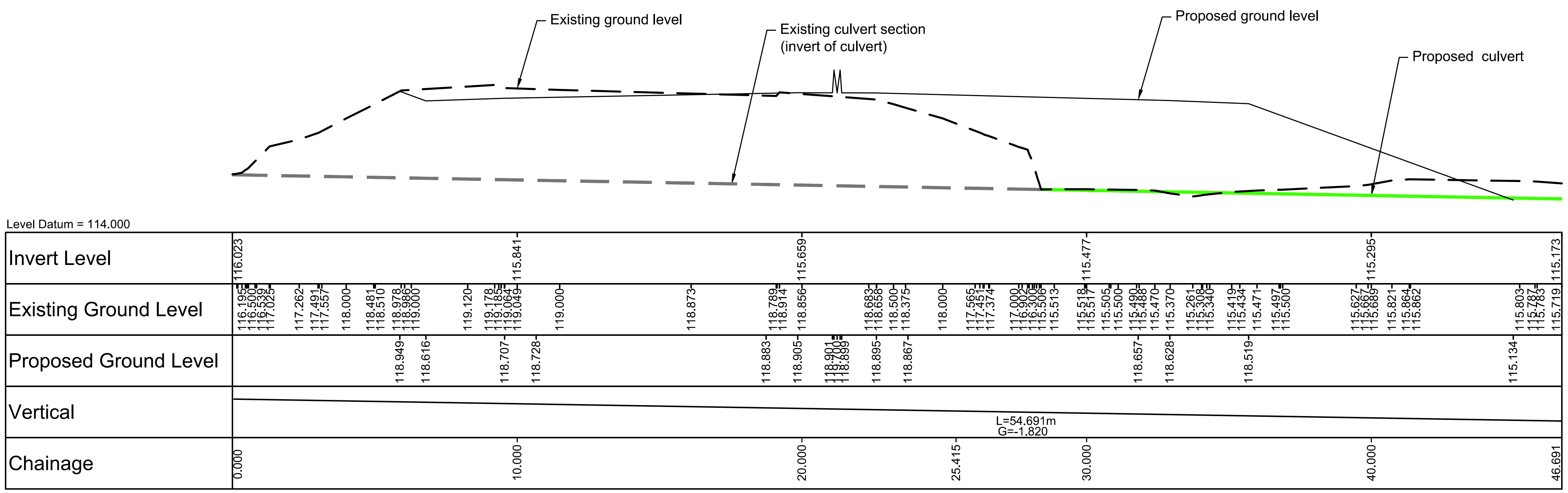
Drawing number / Rev

B1557602/0520/037 Rev 0



PLAN

Scale 1:1000



CULVERT NO. 09 LONGSECTION

Scale 1:200H, 1:200V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	TF	SF	GG	ELM

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Client

TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

Project

A9 DUALLING PERTH TO INVERNESS

Drawing title

LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.09
UNNAMED TRIBUTARY 3 OF
GELLY BURN - NORTH

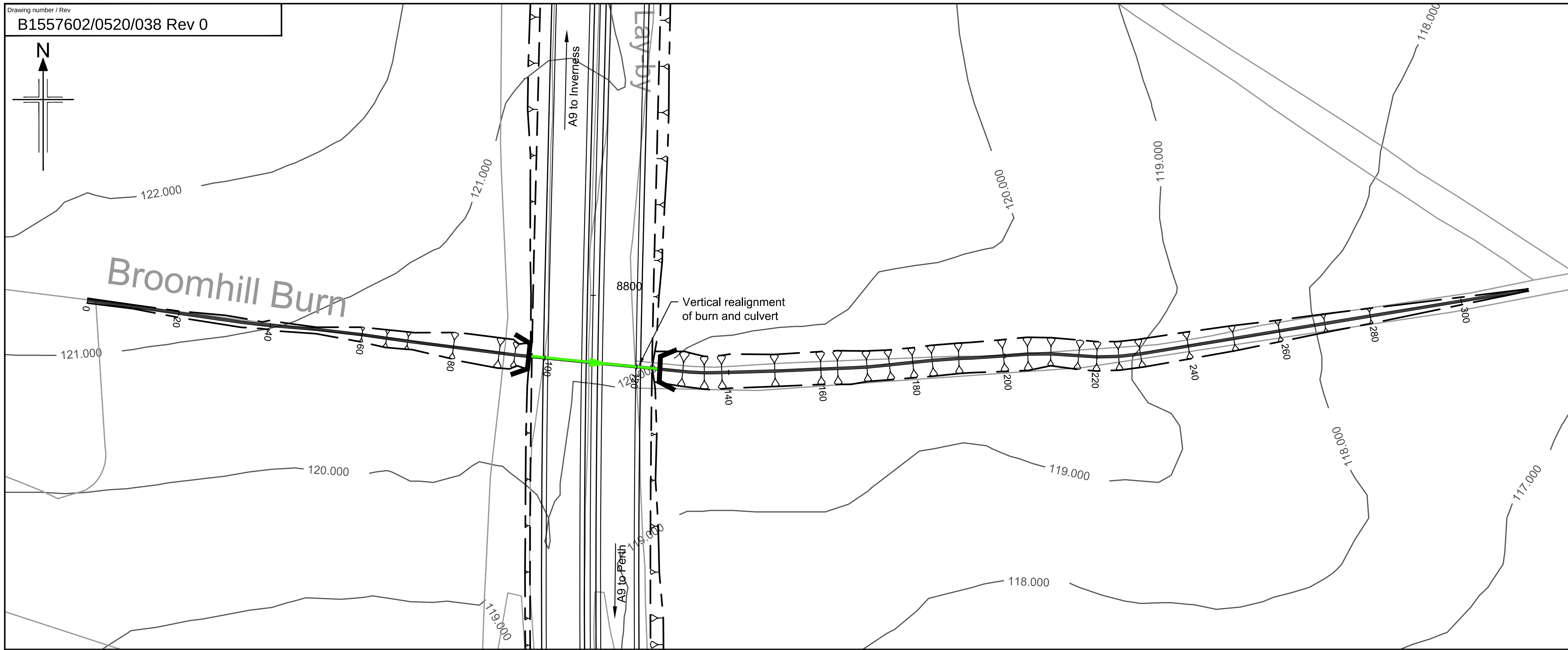
Drawing status

FOR INFORMATION

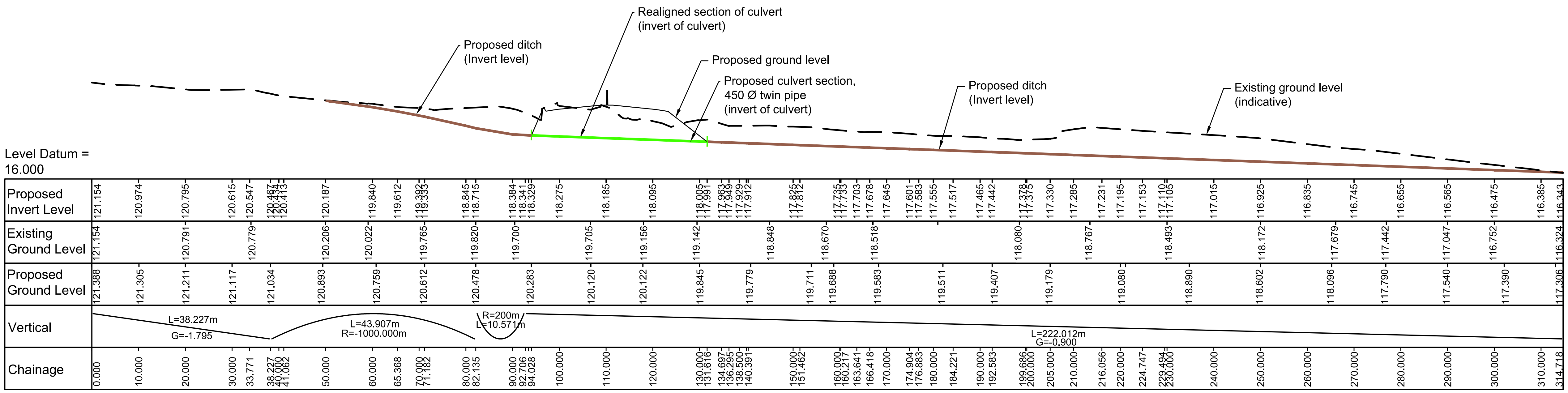
Scale	AS SHOWN @ A3	DO NOT SCALE
Jacobs No.	B1557602	

Drawing number: B1557602/0520/037 Rev: 0

Drawing number / Rev
B1557602/0520/038 Rev 0



PLAN
Scale 1:1000



CULVERT 10 LONGSECTION
Scale 1:1000H, 1:250V

Legend:
- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:
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Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	SAS	SF	GG	ELM

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Client: TRANSPORT SCOTLAND / CÒMHDHAIL ALBA

Project: A9 DUALLING PERTH TO INVERNESS

Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.10
BROOMHILL BURN

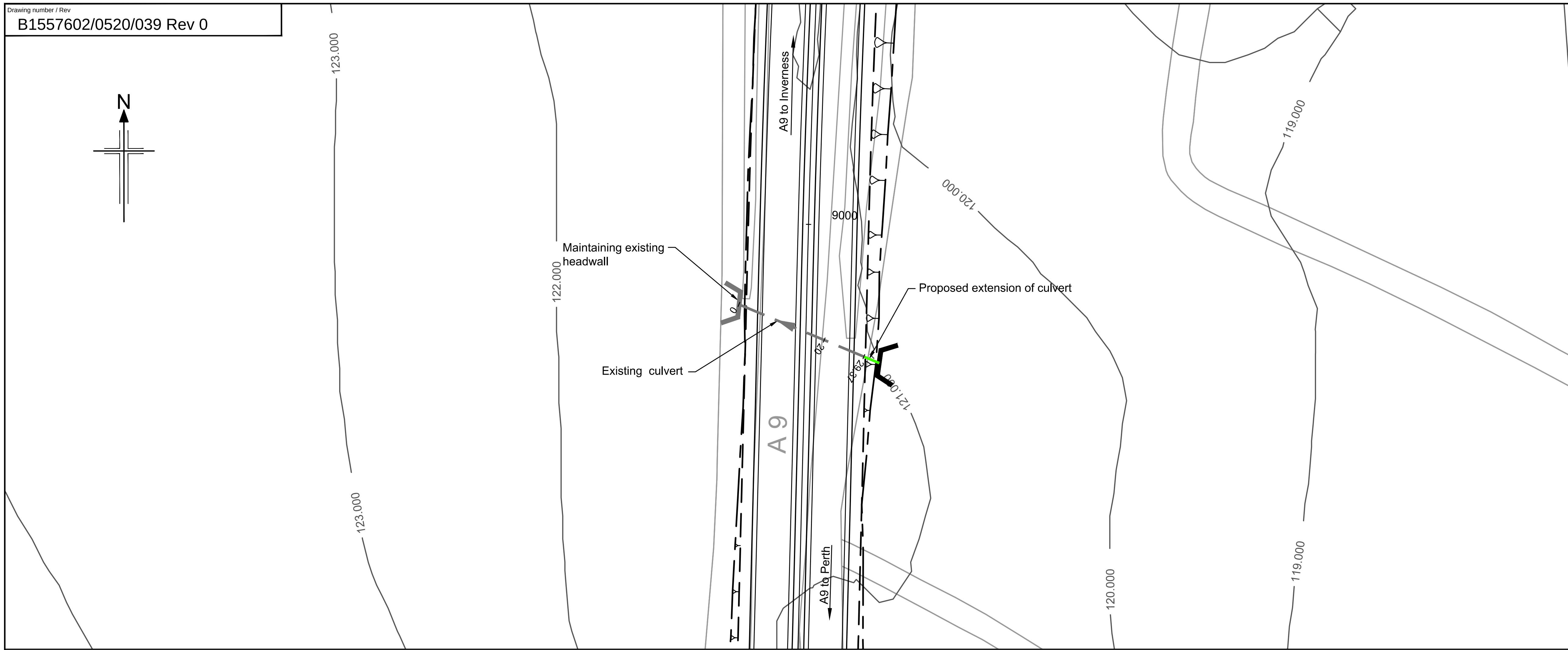
Drawing status: FOR INFORMATION

Scale: AS SHOWN @ A3 — DO NOT SCALE

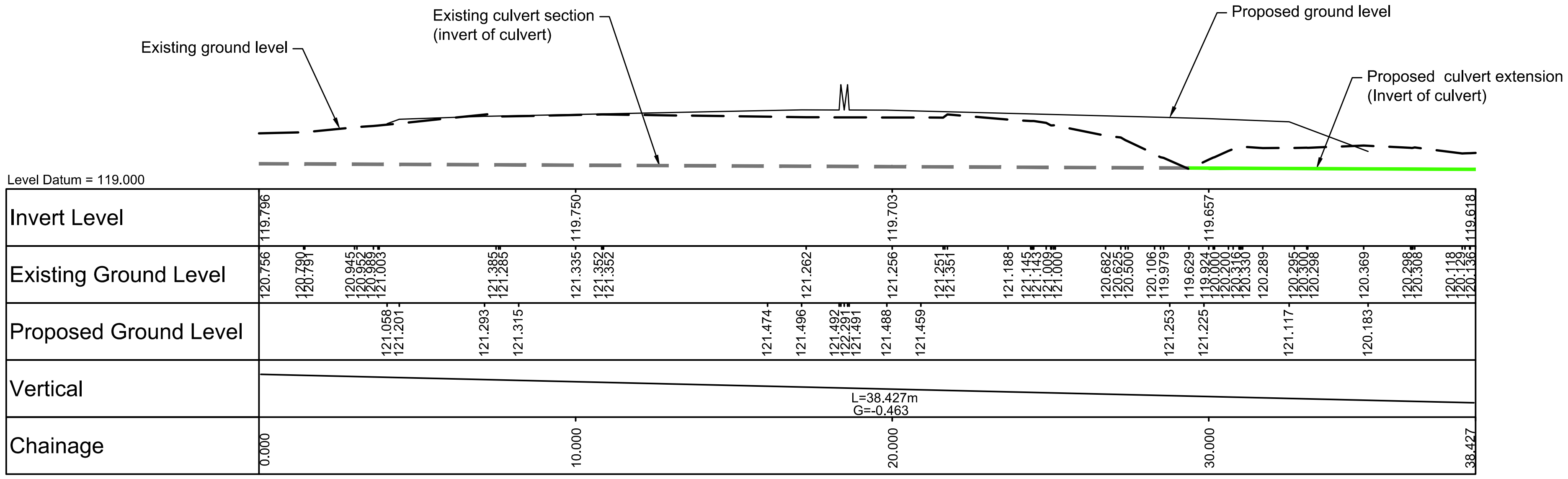
Jacobs No.: B1557602

Drawing number: B1557602/0520/038 — Rev 0

Drawing number / Rev
B1557602/0520/039 Rev 0



PLAN
Scale 1:1000



CULVERT NO. 11 LONGSECTION
Scale 1:200H, 1:200V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

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2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

DRAFT

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0	04/02/14	For Information	TF	SF	GG	ELM

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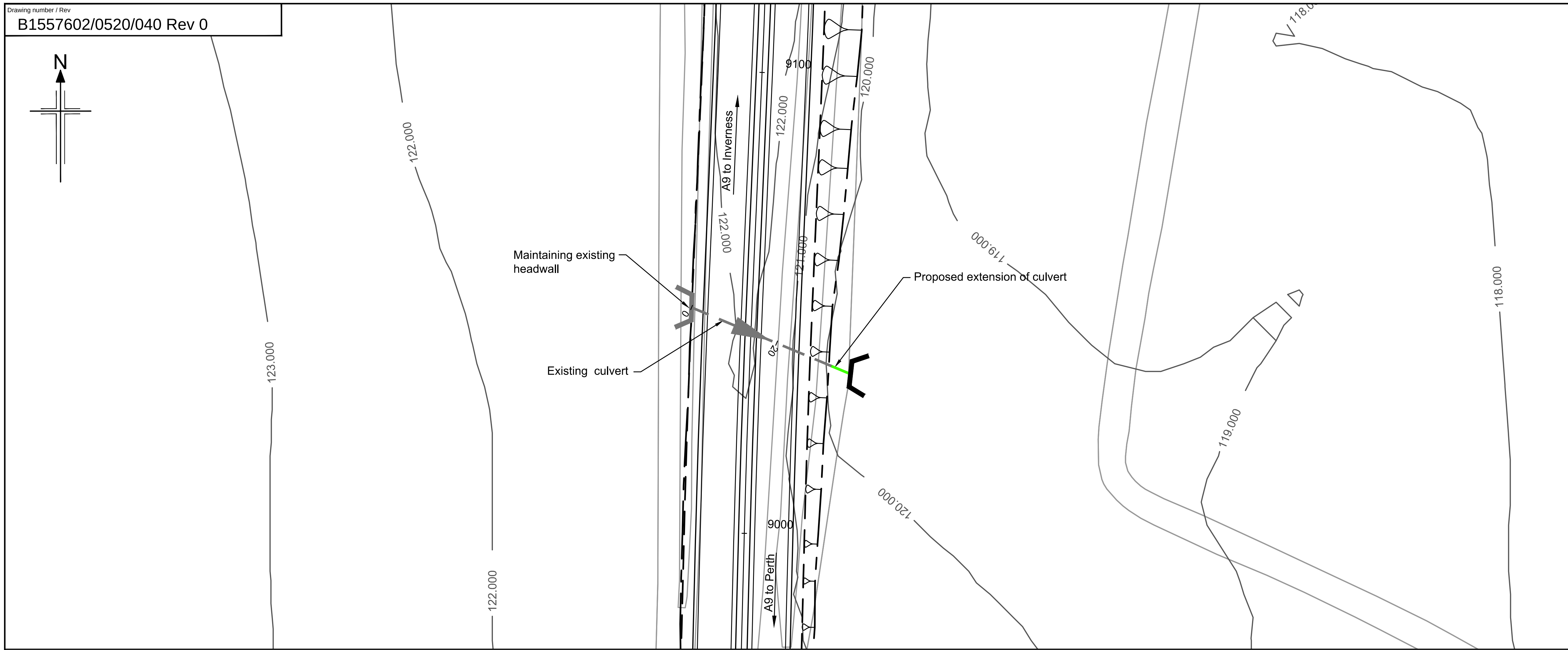
Project
A9 DUALLING PERTH TO INVERNESS

Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.11

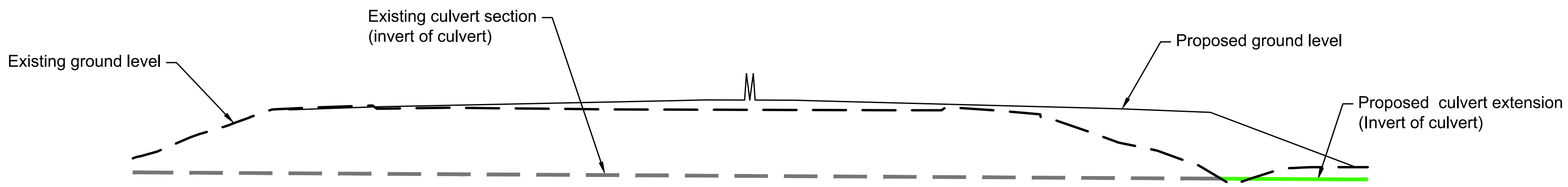
Drawing status
FOR INFORMATION

Scale: AS SHOWN @ A3 | DO NOT SCALE
Jacobs No.: B1557602
Drawing number: B1557602/0520/039 | Rev: 0

Drawing number / Rev
B1557602/0520/040 Rev 0



PLAN
Scale 1:1000



Level Datum = 118.000

Invert Level	119.843, 119.785, 119.727, 119.669, 119.649, 119.626
Existing Ground Level	120.334, 121.000, 121.749, 121.809, 121.768, 121.795, 121.747, 121.733, 121.820, 121.715, 121.600, 121.000, 120.240, 119.525, 120.000, 120.000
Proposed Ground Level	121.767, 121.737, 121.830, 121.852, 122.012, 122.034, 122.031, 122.030, 122.030, 122.027, 121.999, 121.794, 121.766, 121.658, 120.000
Vertical	L=37.379m G=-0.578
Chainage	0.000, 10.000, 20.000, 30.000, 33.465, 37.379

CULVERT NO. 12 LONGSECTION
Scale 1:200H, 1:200V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

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Rev	Rev. Date	Purpose of revision	Drawn	Checked	Reviewed	Approved
0	04/02/14	For Information	TF	SF	GG	ELM

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Client
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CÒMHDHAIL ALBA

Project
A9 DUALLING PERTH TO INVERNESS
Luncarty to Pass of Birnam

Drawing title

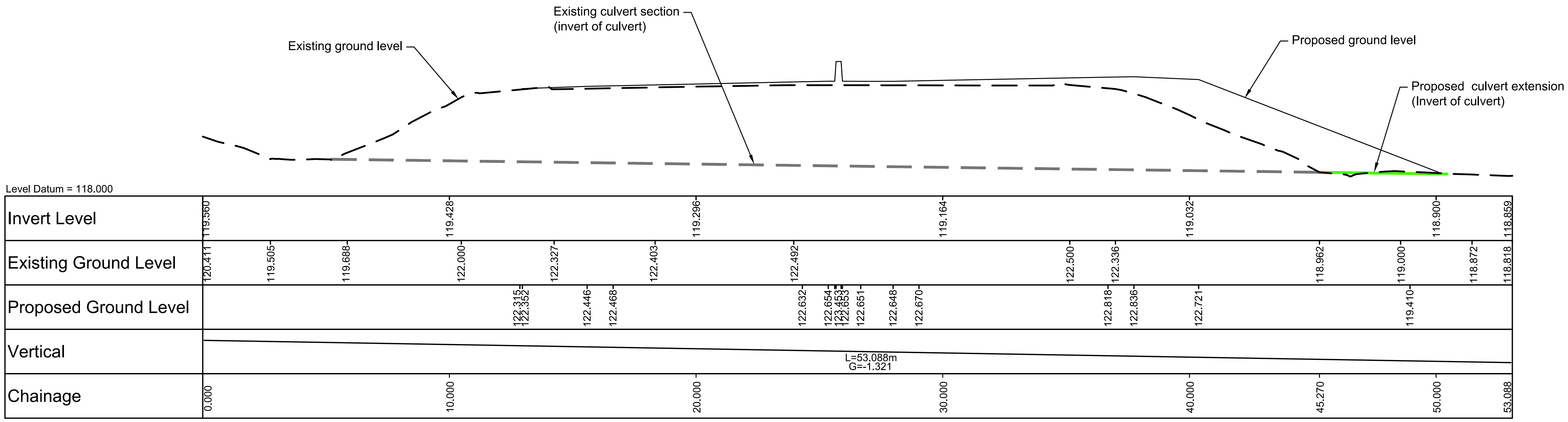
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.12

Drawing status
FOR INFORMATION

Scale	AS SHOWN @ A3	DO NOT SCALE
Jacobs No.	B1557602	
Drawing number	B1557602/0520/040	Rev 0

Drawing number / Rev
B1557602/0520/041 Rev 0

PLAN
Scale 1:1000



CULVERT NO. 13 LONGSECTION
Scale 1:200H, 1:200V

Legend:

- Existing culvert
- Proposed pre-earthwork ditch with direction of flow arrow / realigned burn
- Proposed Network Culvert/ Culvert Extension and Headwall
- Existing headwall

Notes:

1. All dimensions are in metres unless noted otherwise.
2. All details shown on this drawing are indicative only and subject to development at Detailed Design Stage.

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0	04/02/14	For Information	TF	SF	GG	ELM

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Client
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CÒMHDHAIL ALBA

Project
A9 DUALLING PERTH TO INVERNESS
Luncarty to Pass of Birnam

Drawing title
LUNCARTY TO PASS OF BIRNAM
PROPOSED CULVERT No.13

Drawing status
FOR INFORMATION

Scale: AS SHOWN @ A3 | DO NOT SCALE
Jacobs No. B1557602

Drawing number: B1557602/0520/041 | Rev: 0