



Hexham Train Support Facility Turning Angle

Aurizon

Ecological Assessment

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1. Introduction

Jacobs were contracted by Aurizon Holdings Ltd. (Aurizon) to undertake an ecological assessment of the proposed turning angle modification at the Hexham Train Support Facility (TSF). Construction of the turning angle requires a modification to the existing State Significant Infrastructure (SSI) approval MP07_0171.

The proposed turning angle will be located in the southern portion of the site (see Figure 1). The proposed construction and operation of the turning angle will consist of:

- Excavation works for railway track foundation and ballast;
- Approximately 1.5km of rail track and associated signal and turnout infrastructure comprising:
 - a single track straight of approximately 400m in length extending from the existing rail yard to the proposed turning angle;
 - a turning angle with two arcs approximately 250m in length and a straight of approximately 275m;
 - two 85m straight single tracks at either end of the turning angle;
 - four tangential turnouts;
- Construction of vehicular access tracks and associated lighting;
- Installation of culverts within existing drainage channels, under the rail track and access tracks; and
- Associated civil and stormwater works.

The purpose of this assessment is to address Clause 2(c) of Section 7.17 'Modifications of planning approvals or activities' of the BC Act, which states:

(2) The provisions of this Division relating to applications for development consent or State significant infrastructure approvals apply to any such application for modification as follows:

(c) however a further biodiversity development assessment report is not required to be submitted if the authority or person determining the application for modification (or determining the environmental assessment requirements for the application) is satisfied that the modification will not increase the impact on biodiversity values,

The purpose of this report is to document the methods and results of an ecological assessment of the proposed modification to determine if there will be an increase in impacts on biodiversity values. Biodiversity values are those values as outlined in Section 1.5 of the *Biodiversity Conservation Act 2016* (BC Act) including the additional values outlined in the Biodiversity Conservation Regulation 2017.



JACOBS NSW SPATIAL - GIS MAP file : IA088000_GIS_ECO_F004_TurningAngleAsentL_r1v1 | 16/05/2019

Legend

- Heavy rail
- Turning angle design (100%)
- Turning angle project boundary
- Property boundary
- NPWS Estate (OEH)
- Coastal Management SEPP - Coastal Wetlands
- GDE 2018**
- Coastal Floodplain - sedgeland / rushland / forbland
- Mangrove
- Phragmites australis & Typha Freshwater Wetland
- Saltmarsh
- Swamp Oak Swamp Forest (intact)

Figure 1 | Location of proposed turning angle and surrounding vegetation

2. Methods

2.1 Document review

A review of project documentation was undertaken to gain an understanding of the primary ecological constraints relating to the construction of the Hexham TSF and the proposed modification. The review included the following reports and documents:

- QR National – Train Support Facility, Hexham. Ecological Investigations (Eco Logical 2012)
- Aurizon – Train Support Facility, Hexham. Ecological Investigations (Eco Logical 2013)
- State Significant Infrastructure – Modification. Maitland Road, Hexham NSW Train Support Facility (Ethos Urban 2018)
- Planning Secretary's Environmental Assessment Requirements Hexham Train Support Facility Modification (MP 07_0171 MOD 1)
- NSW Long Term Train Support Facility Turning Angle Design Report (100% Issue) (GHD 2018)
- Hexham Train Support Facility Ecological Monitoring Program. Operational Monitoring Reports (Jacobs 2016/17/18).

2.2 Site inspection

A survey of the study area was conducted on 12 February 2019 to identify any vegetation communities present and ground-truth the results of the background research. The proposal footprint was surveyed by a walkover, recording biodiversity values using a hand-held GPS device. Biodiversity values are those as outlined in Section 1.5 of the BC Act, and the Biodiversity Conservation Regulations 2017, and include:

- vegetation integrity - being the degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state
- habitat suitability - being the degree to which the habitat needs of threatened species are present at a particular site
- biodiversity values, or biodiversity-related values, prescribed by the regulations including:
 - threatened species abundance - being the occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site
 - vegetation abundance - being the occurrence and abundance of vegetation at a particular site
 - habitat connectivity - being the degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range
 - threatened species movement - being the degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle
 - flight path integrity - being the degree to which the flight paths of protected animals over a particular site are free from interference
 - water sustainability - being the degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site.

The site inspection did not involve any targeted survey methods. Previous survey data and existing information relating to the project is sufficient to inform the assessment. The site inspection was used to confirm existing data to assess the potential impact of the proposed modification on the above biodiversity values.

2.3 Limitations

The field survey provides a limited view into the whole study area. The diversity of flora and fauna species recorded from this study should not be seen to be comprehensive, but rather a snap shot of the species present

at the time of the survey. A period of several seasons or years is often needed to identify all the species present in an area, especially as some species are only apparent at certain times of the year e.g. orchids or migratory birds and require specific weather conditions for optimum detection e.g. breeding and flowering periods. The conclusions of this report are therefore based upon available data and limited field survey and are indicative of the environmental condition of the subject sites at the time of the survey. It should be recognised that site conditions, including the presence of threatened species, can change with time. To address this limitation, the assessment has aimed to identify the presence and suitability of the habitat for threatened species as discussed in the following section.

3. Results

The proposed modification footprint is located within land which has been highly modified from its natural state by a long history associated with coal stockpiling, loading and unloading. Most of the site has had substantial landform modification, with the addition of a significant quantity of coal tailings to raise the level of the ground above the surrounding floodplain wetlands (see Photo 1 in Appendix A). Following completion of the construction of the Hexham TSF, the Ecological Monitoring Program (Eco Logical 2015) stipulated that much of the fill area that was disturbed by the works was to be rehabilitated to its previous condition, which is understood to have been pasture groundcover. Subsequent irrigation and grazing have encouraged the growth of exotic pasture species, which now cover most of the site. The dominant native groundcover species is *Cynodon dactylon* (Common Couch), a grass which is common across the broader site in both disturbed and undisturbed areas. *Cynodon dactylon* is not indigenous to the Hunter region but is now widespread across most of NSW and is likely to have established from turf grass.

The only areas within the site that contain a different assemblage of native species are several constructed swale drains (see Plate 2 and Plate 3 in Appendix A). These drains are presumably designed to move water across the site during periods of high rainfall and are predominately dry throughout the year. During periods of rainfall and inundation, seed and sediment has been deposited in the drains and there are a variety of native wetlands species established in the drains, including *Phragmites australis* (Common Reed), *Typha orientalis* (Bulrush), *Persicaria lapathifolia* (Pale Knotweed), *Persicaria decipiens* (Slender knotweed) and *Alternanthera denticulata* (Lesser Joyweed).

The more permanent wet areas outside of the turning angle footprint have been mapped by Eco Logical (2012/13) as freshwater wetlands and are consistent with *Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* endangered ecological community (EEC) listed under the BC Act. The drains within the current proposal area, however, are unmapped.

The NSW Office of Environment and Heritage Threatened Species Scientific Committee scientific determination for the *Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* EEC states,

... Artificial wetlands created on previously dry land specifically for purposes such as sewerage treatment, storm water management and farm production, are not regarded as part of this community, although they may provide habitat for threatened species (OEH, 2011).

While originally the area is likely to have been part of a wetland, the drains are located within the centre of a long-disturbed spoil fill area that has been raised up above the level of the surrounding wetland. Vegetation already mapped as freshwater wetland outside of the site is lower-lying and closer to natural occurrences of this vegetation community. Given the purpose of the drains is to manage stormwater and their elevation on unnatural substrate has placed the drains above natural floodplain levels, they are not naturally occurring wetlands and are not considered to adequately meet the criteria for the freshwater wetlands EEC. The drains contain common opportunistic wetland species that will readily colonise wet areas and are not a natural coastal floodplain community. This vegetation is not listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). No threatened flora species have been identified within the proposal footprint.

The drains may provide low quality habitat for common amphibian and bird species. Eco Logical (2012/13) undertook detailed impact assessments for 18 threatened species (Table 12 – Appendix C of their report). These species include numerous insectivorous bats, wetland birds, Grass Owl, Little Eagle and the Green and Golden Bell Frog. The birds and bats may pass through or forage over top of the site on occasion, however no important habitat is present, and the proposal is unlikely to impact the movement of these species. The Green and Golden Bell Frog (*Litoria aurea*) was flagged as potentially occurring, considering the proximity of the site to two known populations in the Lower Hunter; 'Hexham Swamp and Sandgate' and 'Kooragang Island'. Numerous surveys have been undertaken for the Green and Golden Bell Frog over the years by Eco Logical (2012/13/15) and as part of the Hexham TSF Operational Ecological Monitoring Program (Jacobs 2016/17/18), however it has never been identified within the site. Despite this, the Green and Golden Bell Frog is known to show up in areas after long periods of apparent absence. Although no known breeding habitat is present within

or directly adjacent to the Hexham TSF site, there remains a low likelihood that this species may travel onto the site during favourable weather conditions. However, considering this low likelihood, and the low-quality habitat presented by the drains running through the proposal footprint, the proposal is unlikely to impact this species in any way that was not assessed by the original project ecological investigations (Eco Logical 2012/13).

As described by Ethos Urban (2018), parts of the proposal are directly adjacent to vegetation mapped by Eco Logical (2012/13) as threatened ecological communities, including:

- *Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* (listed as endangered under the BC Act)
- *Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (listed as endangered under the BC Act)
- *Subtropical and Temperate Coastal Saltmarsh* (listed as vulnerable under the EPBC Act)
- *Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions* (listed as endangered under the BC Act)
- *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community* (listed as endangered under the EPBC Act) – this EEC has been listed since the ecological investigations undertaken as part of the TSF project approval (Eco Logical 2012/13)

The proposal design should consider the sensitivity of these areas and implement measures to avoid impacts during construction and operation such as machinery damage, erosion and contamination.

State Environmental Planning Policy (Coastal Management) 2018

Saltmarsh vegetation to the south of the footprint is mapped as 'Coastal Wetlands' under the Coastal Management 2018 SEPP and therefore some 'Proximity Area for Coastal Wetlands' (i.e. 100 metre buffer around the saltmarsh) is mapped within the footprint. Clause 11 of the SEPP states that:

- (1) Development consent must not be granted to development on land identified as "proximity area for coastal wetlands" on the Coastal Wetlands Area Map unless the consent authority is satisfied that the proposed development will not significantly impact on:
 - (a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or
 - (b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.

Eco Logical (2010/13) assessed the saltmarsh and freshwater wetland area which falls under the mapped wetland as part of the original TSF biodiversity assessment. This assessment stated that no direct or indirect impacts were likely as a result of the development. Although the footprint of the now proposed turning angle intersects the mapped 'Proximity Area of the Coastal Wetland', the intersected land (as previously stated) is highly modified with artificial drainage that would not result in run-off being discharged into the saltmarsh. The historically modified land within the proposal footprint is within a mapped buffer to the wetland although lacks biophysical, hydrological or ecological integrity.

The proposed development, as part of the approved TSF is subject to the range of consent conditions and corresponding mitigation measures applied to the TSF. Such measures were applied to avoid and minimise potential impacts associated with stormwater entering the wetland vegetated areas to the south of the development footprint. The relevant mitigation measures are summarised in Chapter 4 of this report and are applicable to the proposed modification.

The mitigation applicable to the protection of the proximal mapped coastal wetlands relates to stormwater from the site being diverted to a drain on the western boundary of the turning angle where it is directed into one of three constructed stormwater detention basins for treatment of suspended sediments and nutrients through floating wetlands, prior to its offsite discharge. The sediment basins also contain Gross Pollutant Traps at their outlets. As part of the conditions of consent, monitoring of surface and groundwater quality will continue to be undertaken during operation of the turning angle to inform decisions regarding discharge. The biophysical,

hydrological, or ecological integrity of the adjacent coastal wetland is not expected to change as result of the modification and no additional or significant impacts to Coastal Wetlands as described in Clause 11 of the Coastal Management 2018 SEPP are expected as part of the proposed modification.

Additionally, a small portion of ‘Coastal Environment Area’ is mapped within the south eastern corner of the proposed footprint. This is indicative mapping and the area located within the footprint is highly modified with artificial drainage. Development within this area is unlikely to cause an adverse impact on the Coastal Environment Area as described in Clause 13 of the Coastal Management 2018 SEPP.

3.1 Biodiversity values

Table 3.1 below lists the eight biodiversity values outlined in Section 1.5 of the BC Act, and the Biodiversity Conservation Regulations 2017, and provides a brief discussion of the potential impacts relating to the proposed Turning Angle modification.

Table 3 1: Potential impacts to biodiversity values

Biodiversity Value	Meaning	Relevant (✓ or NA)	Explain and Document potential impacts	
			Information required	Hexham TSF Turning Angle modification
Vegetation integrity	Degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state	✓	Describe any impacts on the vegetation integrity of identified plant communities.	Native vegetation where the turning angle would be built is very limited, with <i>Cynodon dactylon</i> dominated grassed spoil areas with drains that contain some opportunistic wetland species. The integrity of the vegetation is poor, with the vegetation having been comprehensively modified from its original state. No high-quality native vegetation will be directly impacted. The design should consider adjacent sensitive areas and measures will be implemented to avoid off site and indirect impacts during construction and operation such as machinery damage, erosion and contamination.
Habitat suitability	Degree to which the habitat needs of threatened species are present at a particular site	✓	Identify any threatened species or ecological communities or their habitat on the development site. In addition to native vegetation, habitat may include non-native vegetation, human made structures, rocks, karst, caves, crevices, cliffs and other geological features of significance.	The habitat suitability is limited. The drains provide marginal habitat for common frog and bird species. Although some threatened bird and bat species may pass through or forage over the site, no important threatened species habitat is present.

Biodiversity Value	Meaning	Relevant (✓ or NA)	Explain and Document potential impacts	
			Information required	Hexham TSF Turning Angle modification
			Describe how the proposed development avoids impacts on habitat suitability and identify the likelihood and extent of any remaining impacts including the removal or modification (e.g. noise, light etc.) of threatened species habitat or ecological communities.	No threatened ecological communities or threatened species habitat is likely to be impacted by the proposed modification. Impacts to adjacent wetlands and saltmarsh, and threatened species habitat, have been avoided through siting the turning angle on the spoil area.
Threatened species abundance	Occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site	✓	Describe how the proposed development avoids impacts on threatened species abundance and identify the likelihood and extent of any remaining impacts including whether the proposed development is likely to result in vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.	No threatened species are known to occur in the area of the proposed turning angle and none are likely to be significantly impacted by the proposed modification. Impacts to adjacent wetlands and saltmarsh, and threatened species habitat, have been avoided through siting the turning angle on the spoil area.
Vegetation abundance	Occurrence and abundance of vegetation at a particular site	✓	Where vegetation is present on the development site, provide a map on digital aerial photography or the best available imagery of the development site showing: <ul style="list-style-type: none"> • native vegetation (including grasslands and other non-woody vegetation types) and non-native vegetation, and • the area of land that is directly impacted by the proposed development, including related infrastructure such as roads, pipelines, access tracks, temporary material stockpiles, asset protection zones and powerlines, if applicable. Describe how the proposed development avoids impacts on native vegetation and identify the	The extent of native vegetation around the proposed development site is illustrated by Figure 5 in Eco Logical (2012/13). There is no native vegetation within the proposed modification footprint apart from <i>Cynodon dactylon</i> and opportunistic wetland species in drains. The proposal design has considered the adjacent sensitive areas and during construction and operation measures will be implemented to avoid indirect and off-site impacts.

Biodiversity Value	Meaning	Relevant (✓ or NA)	Explain and Document potential impacts	
			Information required	Hexham TSF Turning Angle modification
			likelihood and extent of any remaining impacts including removal of isolated or cultivated native plants.	
Habitat connectivity	Degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range	✓	<p>Identify whether the development site contributes to habitat connectivity.</p> <p>Describe how the proposed development avoids impacts on habitat connectivity and identify the likelihood and extent of any remaining impacts.</p>	<p>The stormwater drains may offer some functional habitat connectivity for ground dwelling fauna between wetland areas to the east and west of the proposed development as a 'stepping stone'.</p> <p>The Green and Golden Bell Frog is considered to have a low likelihood of occurring around the site based on the proximity of two known populations. The drains may offer connectivity during periods of high rainfall; however, the drains are predominately dry.</p> <p>Although there will be a temporary disturbance, connectivity will be re-established through culverts constructed as part of the proposed modification. Impacts to habitat connectivity are expected to be minimal as the drains will be re-instated.</p>
Threatened species movement	Degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle	✓	Describe how the proposed development avoids impacts on threatened species movement and identify the likelihood and extent of any remaining impacts.	<p>Although there will be a temporary disturbance to the stormwater drains, connectivity will be re-established through culverts constructed as part of the proposed modification.</p> <p>Impacts to high quality habitats have been avoided by siting the turning angle on the spoil area which threatened species are unlikely to utilise as a significant source of habitat. This has limited impacts to threatened species movement.</p>

Biodiversity Value	Meaning	Relevant (✓ or NA)	Explain and Document potential impacts	
			Information required	Hexham TSF Turning Angle modification
Flight path integrity	Degree to which the flight paths of protected animals over a particular site are free from interference	✓	<p>Identify whether flight paths of protected animals occur over the development site.</p> <p>Describe how the proposed development avoids impacts on flight path integrity and identify the likelihood and extent of any remaining impacts.</p> <p>For proposed wind farms, describe any impacts of wind turbine strikes on protected animals.</p>	<p>The proposed modification is located on land which is predominately cleared. However, it is situated within the Hunter River floodplain and wetlands, which is known to contain habitat for many threatened and migratory birds.</p> <p>It is likely that these migratory bird species will fly over the proposal footprint on occasion, however (considering the current infrastructure) they are unlikely to fly at a height which would be interrupted by the construction and operation of the proposal.</p> <p>Threatened insectivorous bat species may also forage over the proposal footprint. However, there is unlikely to be a commonly used flight path over the site and no significant barriers to flight will be introduced. Any impacts to flight paths would be minimal and bats will still be able to fly over the site once it is built and operational.</p>
Water sustainability	Degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site.	✓	<p>Describe how the proposed development avoids impacts on water sustainability and identify the likelihood and extent of any remaining impacts (including from subsidence or upsidence resulting from underground mining or other development).</p>	<p>The proposal is near EECs and Groundwater Dependant Ecosystems that may be impacted. However, the proposal will be constructed within an established raised area made from coal tailings that contains existing stormwater infrastructure (i.e. the drains). It is understood that new drains and culverts will be constructed as part of the proposed modification to catch and direct run-off of sediment and pollutants into the existing water quality basin within the TSF. The proposal design has considered the adjacent</p>

Biodiversity Value	Meaning	Relevant (✓ or NA)	Explain and Document potential impacts	
			Information required	Hexham TSF Turning Angle modification
				sensitive wetland areas and measures to avoid impacts will be implemented during construction and operation.

4. Mitigation Measures

The following information regarding stormwater and ecological mitigation measures is derived from the approved Construction Soil and Water Management Plan (Worley Parsons, 05 February 2014) and the Flora and Fauna Management Plan (Aurizon, 10/10/2013). The requirements to fulfil the relevant conditions of consent are outlined below.

Stormwater Management

A Construction Soil and Water Management Plan was prepared to support construction and operation of the TSF. Management actions documented within this plan will also apply to the Turning Angle modification. This plan contains appropriate management measures designed to mitigate the impacts of stormwater across and off the site. Furthermore, as part of the conditions of consent, the project CEMP will be updated to accommodate the proposed turning angle works and will include an updated Construction Soil and Water Management Plan.

Stormwater and runoff will be diverted to a drain on the western boundary of the SSI and directed into one of three stormwater detention basins for treatment of suspended sediments and nutrients through floating wetlands, prior to its offsite discharge. This stormwater system shall be capable of treating at least a 1% AEP stormwater event. Sediment basins also use a Gross Pollutant Trap (GPT) at the existing outlet and will continue to operate post-construction of the turning angle. This will prevent polluted water from the proposed turning circle entering the nearby wetlands mapped as 'Coastal Wetlands' under the Coastal Management 2018 SEPP.

Access roads shall be provided with road side swales to provide treatment through flow attenuation and entrainment of suspended sediments. The proposed cess drains either side of the rail track will contribute to the removal of water from the track ballast and direct its flow towards Basin 3 and the appropriate management location. They will be designed to avoid long term connection with groundwater.

As part of the conditions of consent, monitoring of water quality will continue to be undertaken during operation of the turning angle.

Ecological Management

The proposed modification requires no additional vegetation clearing, other than minor clearing of exotic grasses located adjacent the existing southern access track and along the intended alignment of the turning angle. Any minor clearing or earthworks will be undertaken in compliance with the Managing urban stormwater: soils and construction. Vol 1. Furthermore, all excavation activities for the turning angle will be minimised where practical.

Due to the absence of native vegetation and habitat for Green and Golden Bell Frog within the modification development footprint, the condition of consent (E7-E10) regarding the need for pre-clearing surveys, ecologist spotter catcher and GGBF management plan, does not apply to the turning angle site.

However, vehicles and machinery must be clean prior to entering the development site. Effort should be made to remove all soil or plant materials from vehicles to ensure that seeds of other exotic plant species are not brought onto site.

5. Conclusion

The vegetation integrity of the site is poor and is not representative of natural vegetation in terms of composition, structure or function. The habitat is suitable for some common opportunistic species that are tolerant of disturbance and can colonise disturbed land. Threatened species are considered unlikely to occur as the habitat requirements of most threatened species are absent. Threatened species abundance would be classed as very low. Vegetation abundance is unlikely to be affected as the grassy *Cynodon dactylon* (Common Couch) areas provide little value and the drains will be recolonised by wetland species once re-instated. The site offers little in the way of habitat connectivity or promoting species movement. Once the drains are re-instated, a similar level of connectivity will return. The open grassed areas offer little in the way of connectivity value. The turning angle is not considered likely to block flight paths as it will not introduce movement barriers for flying species. Species will still be able to disperse to and from the wetland to other areas of habitat. The proposal is near EECs and Groundwater Dependant Ecosystems that may be impacted. However, the proposal will be constructed within an established raised area made from coal tailings that contains existing stormwater infrastructure (i.e. the drains). New drains and culverts will be constructed as part of the proposed modification to catch and direct run-off of sediment and pollutants into the existing water quality basin within the TSF. The proposal design has considered the adjacent sensitive wetland areas and measures to avoid impacts have will be implemented during construction and operation.

The proposed turning angle modification has been assessed under Section 7.17, Clause 2(c) and is unlikely to result in an increased impact to any of the eight biodiversity values outlined in Section 1.5 of the BC Act, and the Biodiversity Conservation Regulations 2017. The magnitude of the impact is low considering the siting of the turning angle on a built up highly disturbed coal spoil area. As such a Biodiversity Development Assessment Report under the BC Act is not deemed to be warranted.

6. References

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Appendix A. Site photos



Plate 1. Photo showing coal tailings and large cleared area that is characteristic of most of the proposal footprint



Plate 2. Photo showing a stormwater drain towards the northern end of the proposal footprint.



Plate 3. Photo showing a stormwater drain that will be crossed by the proposed turning angle modification.